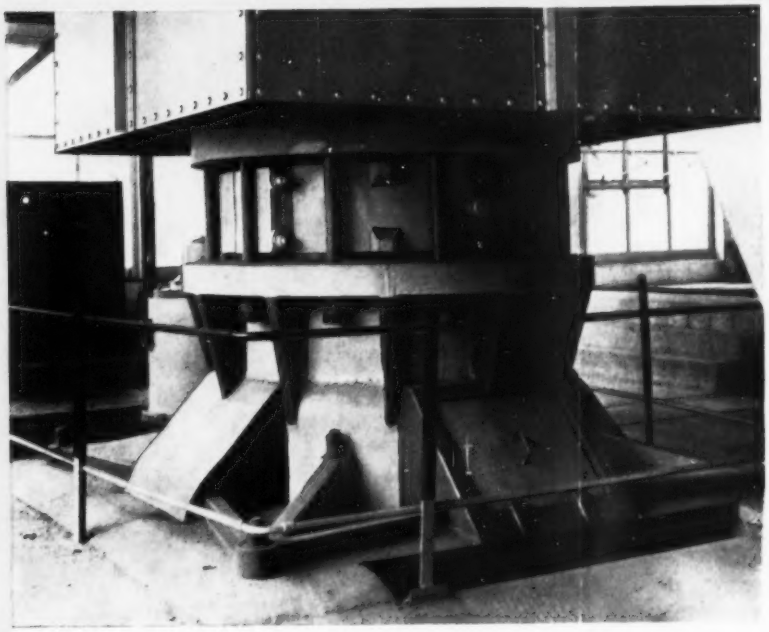
The Mining Journal

Established 1835

Railway & Commercial Gazette

Vol. CCXLVI No. 6289 LONDON, MARCH 2, 1956 PRICE 9d.



Primary, Secondary and Tertiary Crushing

Sheepbridge Kennedy Gyratory Crushers are designed and constructed for crushing stone, rock, ore, or other industrial minerals. They maintain a high rate of output with a consistently well formed product. Power consumption is exceptionally low, and inbuilt rugged construction means trouble free running under adverse working conditions. These qualities apply to all Sheepbridge Quarry and Mining Machinery from individual items of equipment such as Apron Feeders, Screens, Slugger Rolls, Smooth Rolls, Jaw Crushers, Gyratory Crushers, Haulages, etc., to complete Plant Installations. Write today for free catalogue.

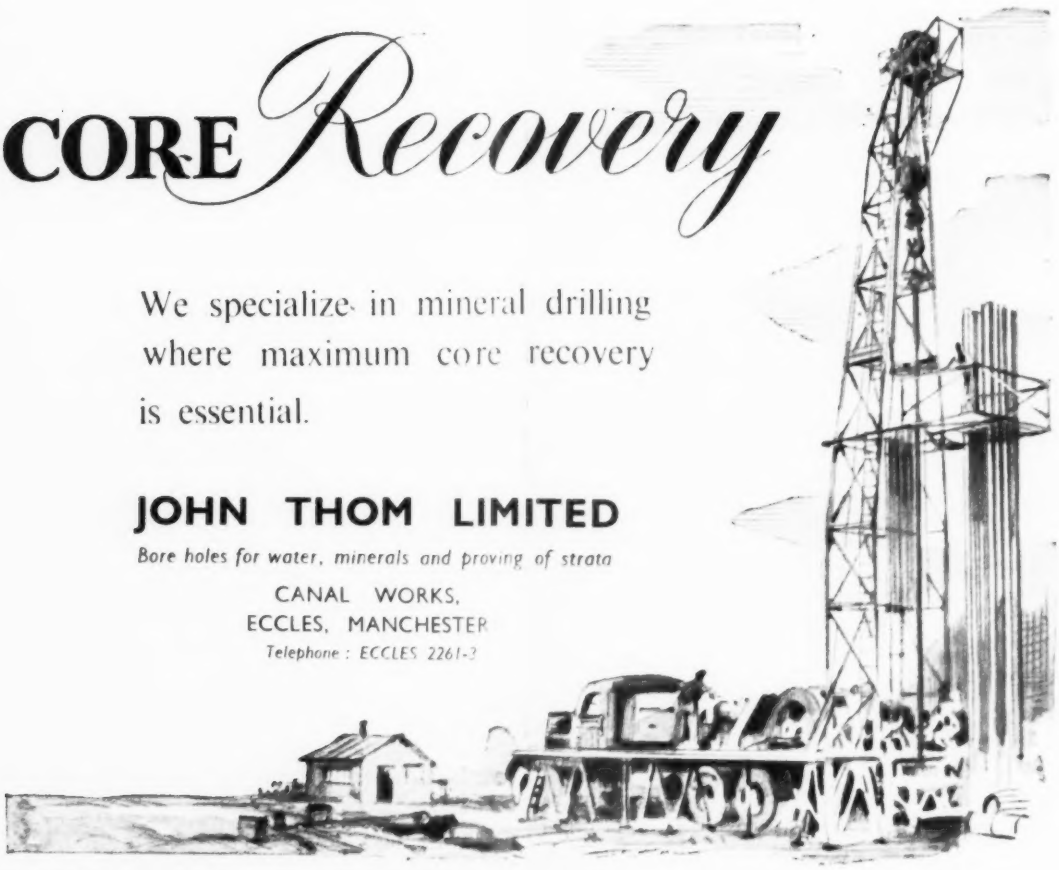
SHEEPBRIDGE EQUIPMENT LIMITED

(One of the Sheepbridge Engineering Group)

CHESTERFIELD

CORE *Recovery*

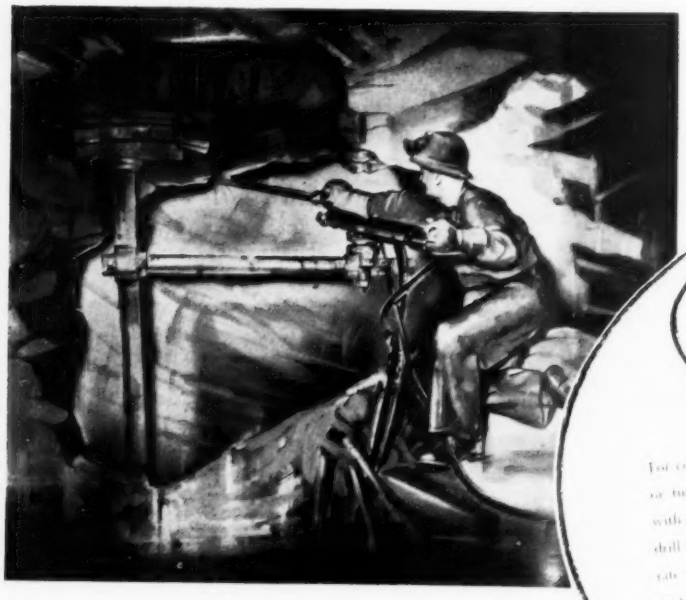
We specialize in mineral drilling where maximum core recovery is essential.



JOHN THOM LIMITED

Bore holes for water, minerals and proving of strata

CANAL WORKS,
ECCLES, MANCHESTER
Telephone : ECCLES 2261-2



for **EVERY DRILLING JOB**

For coal and metalliferous mining the P.M. single insert tungsten carbide tipped bit provides the operator with a fast drilling, simple to use and inexpensive rock drill bit. By virtue of their low initial cost and high rate of penetration, P.M. bits have reduced drilling costs in mines throughout the world.

The RIP BITS range of products covers all rock-drilling applications. Ask your supplier for details.

RIP BITS

RIP BITS LIMITED, HILL ST., SHEFFIELD 2. Tel: 26706
London Office: 66 Victoria St. London S.W.1. Tel: TATe Gallery 0752-3

Belgian Congo Diamonds

The greater proportion of diamonds that come from Africa are from alluvial deposits in the river gravels of the Belgian Congo. They yield about 10 million carats annually. About half are the size known as " sand ", the rest are gems. The diamonds were first found in the lower reaches of the Kasai river. Now most are found between the Kanshi and Bushimaie rivers, 700 miles north east of Elisabethville. It is significant of the primary source of diamonds that prospecting among the gravels has revealed the existence of a number of masses containing Kimberlite or blue ground, which is volcanic. Smit's were the first to adapt industrial diamonds to the modern multi-set bit. Since then they have adapted that form of setting to the drilling of all kinds of formations under all sorts of conditions. Nobody has had a wider or more varied experience. That is why it pays you to consult Smit's first upon any question of diamond drilling. They have the know-how and experience in the designing and manufacture of mining bits that will give you the best possible results, whatever the conditions.

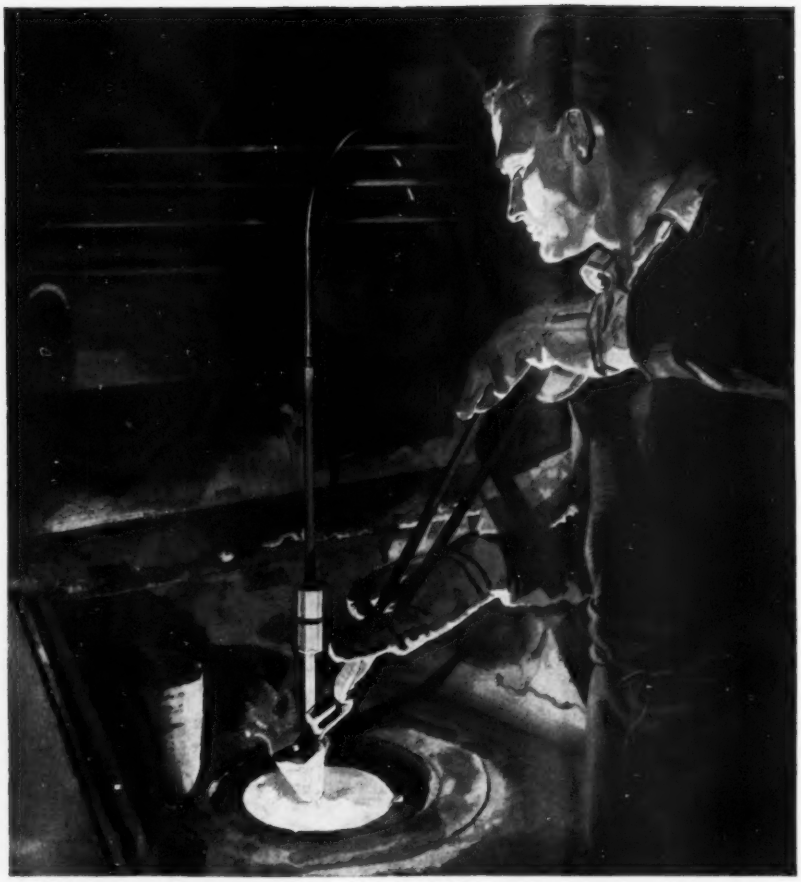
J. K. SMIT & SONS (DIAMOND TOOLS) LTD.

Mining Division: 22-24, Ely Place, Holborn Circus, London, E.C.1

Telephone: ★ HOLborn 6451

And at COVENTRY: Holyhead Chambers, Holyhead Road (Coventry 5215) MANCHESTER: 2, St. John Street (BLAckfriars 0443
Works: COLWYN BAY (Colwyn Bay 2062 and 2291)

J. K. SMIT & SONS INC., Murray Hill, New Jersey, U.S.A. J. K. SMIT & SONS of Canada LTD., 129, Adelaide Street West, Toronto.



Gold refining

Our precious metal smelting and refining service is founded upon more than a century of experience and planned development. A gold refining capacity in excess of 400,000 oz weekly is supported by methods of sampling and assay that assure the speedy and critically accurate assessment of the precious metal contents of any form of gold-bearing material.

Silver and Platinum

Our refineries handle also bullion, ores, concentrates and mining by-products containing silver and the platinum metals.

Johnson Matthey

MELTERS AND ASSAYERS TO THE BANK OF ENGLAND

JOHNSON, MATTHEY & CO., LIMITED · HATTON GARDEN · LONDON · E.C.1

Telephone: HOLborn 6989

R 10

Right from the very beginning...

* The open-type motor control equipment shown here is part of a specially housed installation for controlling a large coal preparation plant in Yorkshire.

In the development of mechanical handling plant for every kind of industry, the close collaboration of electrical and mechanical engineers—right from the beginning—ensures efficient and trouble-free operation to the most complete installation. In this field, as in so many others, much depends on efficient motor control gear—and motor control is our business.

IGRANIC ELECTRIC CO. LTD

HEAD OFFICE & WORKS · BEDFORD

Export Department:
VICTORIA STATION HOUSE 191 VICTORIA STREET LONDON SW1 GRAMS: IGRANIC LONDON
LONDON BIRMINGHAM BRISTOL CARDIFF EAST ANGLIA GLASGOW LEEDS MANCHESTER NEWCASTLE SHEFFIELD

A METAL INDUSTRIES GROUP COMPANY

IG20/2/P.1736

BY ANY METHOD

ANYWHERE IN THE WORLD

SHAFT SINKING

The CEMENTATION COMPANY LIMITED

BENTLEY WORKS, DONCASTER Tel. 54177-8-9

TOUGH and MOISTURE PROOF

The special features of this helmet are toughness with complete resistance to moisture and high resistance to chemicals. The shape has been designed to give increased comfort and improved appearance. It is generally supplied in white, but it can also be finished in black. Lamp brackets are optional.

CROMWELL MINER'S HEADWEAR

Obtainable direct from:—

HELMETS LIMITED, WHEATHAMPSTEAD, HERTS.

MOUNTSORREL GRANITE GROUP

MOVE 150 TONS AN HOUR BY

STRAIGHT-LINE LOADING WITH

MERTON OVERLOADERS

This photograph shows one of the Merton Overloader fleet owned by the Mountsorrel Granite Group loading lorries from stockpiles of granite chippings.

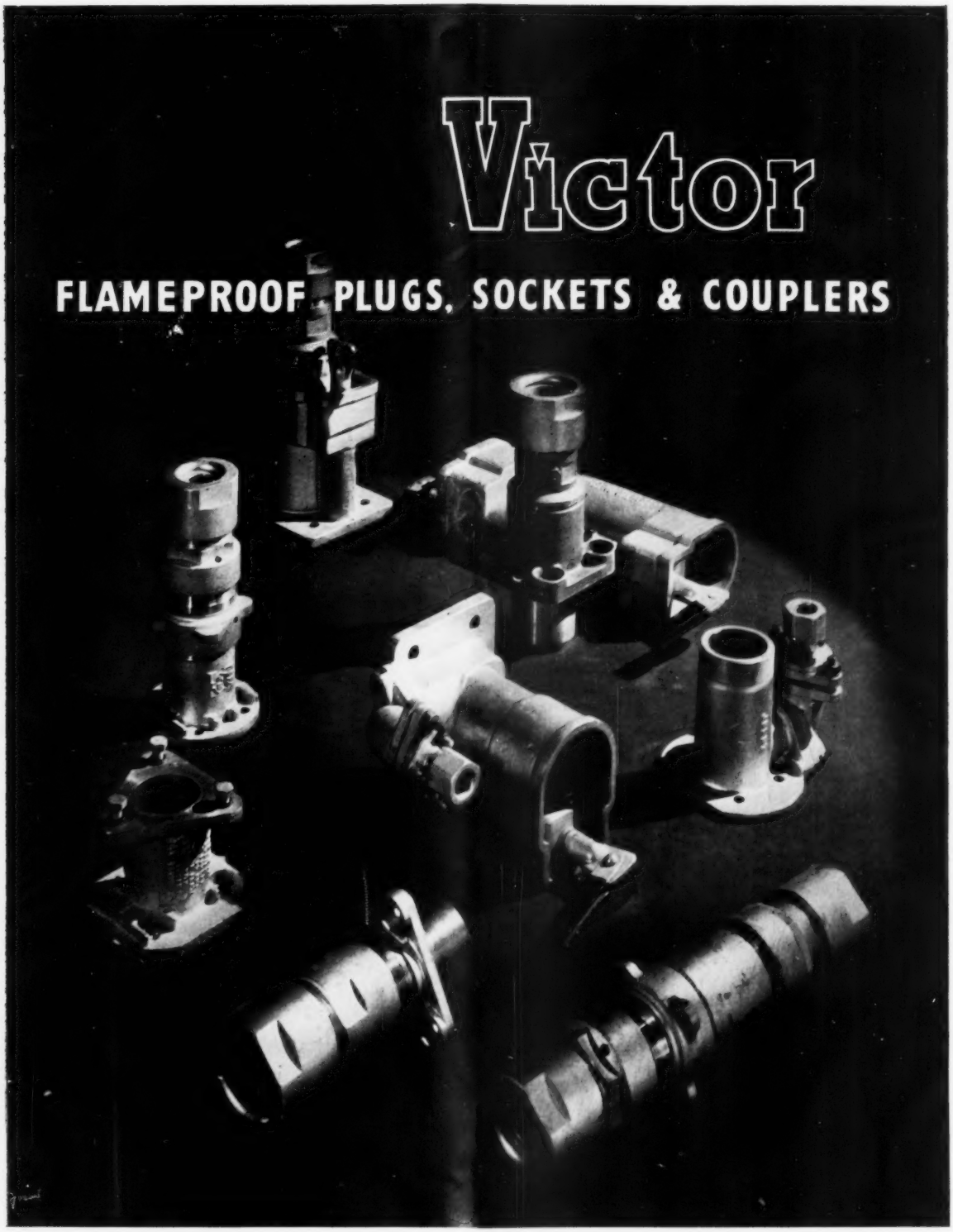
The Mountsorrel Granite Group has been using a fleet of Merton Overloaders for over 2 years and has proved their efficiency and economy for the fast loading of all types of material. The rigid box-like construction of Merton Overloaders gives them the necessary strength for tough quarry work. The cable operation is simple and economical and requires little maintenance.

FEATURES OF THE MERTON OVERLOADER Mk.V

- *3-4 buckets per minute*
- *Full width 3/4 cu. yd. bucket*
- *Variable discharge height*
- *Adjustable digging depth*

MACKAY of Feltham

MACKAY INDUSTRIAL EQUIPMENT LTD., FAGGS ROAD, FELTHAM, MIDDLESEX (FELTHAM 3435-9). *Distributors for Scotland:* SCOTTISH LAND DEVELOPMENT CORPORATION, GLASGOW. *Distributors for Northern Ireland:* THE CONTRACTORS' PLANT (SALES) COMPANY, BELFAST. *Distributors for Eire:* McGEE'S STORES LTD., ARDEE, CO. LOUTH



Please write for details to :-

VICTOR PRODUCTS (WALLSEND) LTD.

WALLSEND-ON-TYNE · ENGLAND

Telephone : Wallsend 63271 (3 lines) **Telegrams : "Victor," Wallsend**

The Mining Journal
Established 1835

Vol. CCXLVI No. 6289 LONDON, MARCH 2, 1956 PRICE 9d.

CONTENTS

Notes and Comments	255	Mining Miscellany	264
From Our South African Correspondent	257	Metals, Minerals and Alloys	265
Expansion of the Uranium Mining Industry	258	The Mining Markets	267
The Mining Industry in Morocco in 1955	260	Company News and Views	268
Labour for South Africa's Gold Mines—II	261	Company Meetings	270
Machinery and Equipment	263	Rambutan Limited ; Falcon Mines Limited.	

Published by The Mining Journal Ltd., at 15 Wilson Street, Moorgate, London, E.C.2. MONarch 2567 Subscription £2 5s. per annum

NOTES AND COMMENTS

Copperbelt Producers Underwrite Kariba

Some, but not all, of the doubts that the Kariba Gorge project to harness the hydro-electric power potential of the Zambesi River would not be completed on schedule were dispelled last week when Anglo American Corporation of South Africa and the Rhodesian Selection Trust group agreed to loan the Central African Federal Government £20,000,000 over the next five years and make available a further £10,000,000 by accepting a surcharge on their consumption of Kariba power between 1961 and 1967. Additional financial assistance amounting to £8,000,000 has also been provided by The British South Africa Company, which will lend £4,000,000 and by Barclays Bank D.C. and O. and Standard Bank of South Africa who have offered to contribute £2,000,000 each.

The total cost of the Kariba scheme has been estimated at from £100,000,000 to £120,000,000. But the initial cost up to 1960 has been estimated at up to £78,000,000, depending upon the course of prices. However, it is hoped —although no firm offer has been made—that the World Bank, now making a technical appraisal of the scheme, in Rhodesia, will loan up to £30,000,000 and there are grounds for believing that Colonial Development Corporation may contribute approximately £15,000,000. Thus, capital on hand and in sight should carry the cost of the project through its formative stages but will not be sufficient to provide much, if any, margin of funds available for other projects.

While the very size of the project would deter many larger and more firmly established countries, the tremendous need for power establishes the task of its completion as an essential pre-requisite for the economic and political viability of the Central African Federation.

In an economic context the need to overcome the chronic power shortage which has bedevilled expansion plans in the Copperbelt for a number of years is only one aspect. For this deficiency has resulted in one of the chief functions of the Rhodesian railways being confined to the carrying of coal to the Copperbelt. Nor do the benefits of the scheme stop there. Hydro-electric power plant has up to three times the life of thermal plant for purposes of amortization and this source of power will subsequently be available to feed the industrial expansion of the country. Moreover, coal from Wankie can be put to much more productive use than that of raising steam.

Indeed, Sir Roy Welensky voiced the country's need and, incidentally, the justification for the scheme when he stated that the Federation of Rhodesia could not afford not to proceed with the Kariba hydro-electric power project.

But as is so often the case when attempting to differentiate as between the political and the economic issues comprising any given situation no clear line of distinction is possible. Thus, Mr. R. L. Prain has stated that his group's decision to participate in this project was a merging of the self-interest of the copper companies with the interests of the people of the Federation, both black and white. In the short run self-interest of the copper companies can, of course, be described in the context of satisfying the copper producers' hopes and aspirations to expand the scope and size of their operations. Yet the real point at issue is the need to come to grips with the problem of making Central African Federation work. If, indeed, no basic *modus vivendi* can be found to ensure a peaceful and progressive pattern of existence for both black and white in the Federation, the Copperbelt as we know it to-day would crumble with disastrous effects not least for the copper producers. The contribution of £4,000,000 from the British South Africa Company is interesting as it is the logical decision for the company to take following on the firmly held view of the company's former chairman, the late Sir Dougal O. Malcolm, that "commitments are the corollary opportunity". But more than that perhaps is "Chartered's" need to build up its interests and drive down its roots in fresh ground before 1986 when it will have lost all former perogatives granted to it under its original charter.

Although it is easy to find some non-altruistic reason why the mining companies should be prepared to participate in such a scheme, the broad and more generous view to be borne in mind is that the Rhodesian copper mining companies clearly recognize the identity of their own functions with those of the Federation and that in the last analysis making a living is far less important than helping to create conditions for making life worthwhile living.

Mining in Tanganyika in 1955

The salient features of the mining industry in Tanganyika during 1955 were an increase of nearly £500,000 in the value of mineral production and the advent of the airborne prospector equipped with scintillometer as a medium of the intensified search for radio-active minerals. These facts are revealed in the review of the year's operations lately released by the Department of Mines, a lucid report

bearing the signature of V. T. Hockin, Commissioner for Mines.

The total value of all minerals produced in Tanganyika during 1955 is expected to be approximately £5,500,000 when outstanding smelter returns and account sales are received and finalized. Thus the steady annual increase of minerals value from just under £2,000,000 in 1951 to a provisional figure of £5,086,660 last year, reveals the steady upward trend that has been maintained.

The principal factor in the 1955 increase was the bringing into service in May of the new 1,300 ton per day plant of Uruwira Minerals Ltd. at Mpanda Mine, Western Province. This installation resulted in the production of lead-copper concentrates being almost doubled, as 8,822 tonnes valued provisionally at £790,000 were exported compared with the 4,694 tons which realized £396,879 in the previous year.

There was no appreciable increase in the value of the territory's diamond output at a provisional 322,661 ct. valued at £3,188,682 compared with an actual 329,912 ct. valued at £3,107,241 in 1954. The construction of the new recovery plant of Williamson Diamonds Ltd. at Mwadui Mine to treat 7,000 to 7,500 tons of gravel a day continued, but the work is proceeding behind schedule and it is now expected that the plant will come into full operation early this year.

Gold production was slightly lower from reef and alluvial sources, as distinct from the by-product obtained in smelting the Mpanda lead-copper ore which contains gold and silver. Provisional output of refined gold totalled 68,892 oz. to value £864,279 compared with 71,447 oz. at £891,807 previously, the decline being attributable mainly to a contraction of output from declining reef sources in the Lupa goldfield. Elsewhere, output was maintained and at Geita Mine, the largest gold mine in East Africa, satisfactory development continued, production was increased and a new orebody discovered.

At the end of the year a decision was awaited as to whether the Kiabakari mine should be equipped for production. At this property exploratory development by Tangold Mining Co. Ltd. has been in progress for some time.

The provisional statistics relating to tin and tungsten concentrates showed output of the former at 55 l.tons valued at £28,114 and of the latter at 24 l.tons to value £17,625 for the year. Early in the year Kyerwa Syndicate Ltd., one of Tanganyika's principal tin producers, suspended production in favour of a large-scale development programme. The object of this was to ascertain whether the installation of a plant to treat 1,000 tons of ore a day would be justified. Yet in spite of this suspension of operations from a major producer, exports of tin concentrates from the Karagwe field showed a slight increase over those of 1954.

The other principal producer, The Colonial Development Corporation, continued surface and underground operations on a restricted scale. However, the decision was taken to close down at the end of the year. This decision constitutes a serious blow to the immediate prospects of the tinfield. Two small tungsten mines operating in the Karagwe field doubled production on the improved market price of the metal.

Other provisional statistics showed an output of magnesite totalling 328 l.tons (78 l.tons in 1954) valued at £820. During the year 785 tons of coal were mined from one source in the Kivira-Songwe coalfield, and investigations into the potentialities of the field are being undertaken. Some 43,292 oz. silver was produced to value £13,990.

Of particular interest was the special exclusive prospecting licence granted to Mbeya Exploration. The licence covered an area of 90 sq. miles including the Panda Hill pyrochlore deposits. The company is incorporated in Tanganyika and is owned jointly by N. V. Billiton Maatschappij and the Colonial Development Corporation, and the deposits investigated are a source of niobium metal. Subsequent work has disclosed that the discovery is likely to be important, and the decision has been taken to erect a pilot mill. Another discovery of pyrochlore, at Ngualla, was under application for the grant of exclusive prospecting rights to the Anglo American Prospecting Co. (Africa) Ltd. Both these deposits were discovered by personnel of the Geological Survey of Tanganyika.

An important legislative measure enacted during the year repealed the Radio-Active Minerals Ordinance. Certain restrictions on the prospecting for, and development of, deposits of these minerals were thereby removed without impairing Governmental control over exports. Minerals of this nature are now on the same footing as other minerals under the Mining Ordinance. Preliminary prospecting surveys for radio-active minerals were carried out by two companies and a private individual using airborne scintillometers.

At the close of 1955 there were current 11 exclusive prospecting licences aggregating 236 sq. miles, one oil exploration licence in respect of approximately 19,900 sq miles, and 2,025 mining claims and leases covering a further 390 sq. miles. An average of about 16,433 Africans, 285 Asians and 605 Europeans were directly employed in mining and prospecting throughout the year.

The year 1955 closed on a note of steady progress and expansion in most branches of the industry. The final statistics will be contained in the Annual Report of the Department of Mines.

Leprechauns in the Dail

We suspect that a leprechaun has found its way into the Dail. A few months ago we welcomed the decision of the Eireann Government to bring in tax legislation granting four years' tax exemption on all new mining enterprises for the first four years following initial development operations. It was an open secret that these concessions were closely linked with negotiations concerning the establishment of a new copper mining company at Avoca, County Wicklow, by a Canadian corporation. Known locally as the "Silvermines," the workings are estimated to contain at least 15,000,000 tons of proved 1.8 per cent copper ore together with lead and zinc.

Everyone will surely agree that there could be no finer home for leprechauns than an abandoned copper mine. So the proposal to reopen the mines and develop them on a much larger scale than ever wouldn't be to the liking of the little folk at all.

So what can the leprechauns do, in a modern democratic country like Eire, but go to the Dail and plead for the tax concessions to be withdrawn? We suggest that Mr. S. Lemass, former Eire Minister for Industry and Commerce, has unquestionably come under the influence of a leprechaun. In transatlantic parlance he has been "got at". During the second reading of the Bill to legalize the concessions, Mr. Lemass said it was designed to encourage the very type of development least desirable "in the form of raids on Irish mineral resources by large financial interests seeking to obtain as much profit as quickly as possible and then clearing out". All the money for the project was being raised in Canada, and no opportunity was being given to Irish people to invest in this undertaking.

After all, think the leprechauns, if the Irish people have waited a few hundred years without going to all the trouble

and expense of working the copper mines, they are quite likely to leave them alone for another century, as long as investors from other countries can be kept away.

Our explanation for the unexpected opposition to the concessions may strike our less credulous readers as fanciful, but we submit that there is no other which fits the facts equally well. As further evidence that our theory is on the right lines, we cite the former Minister's statement that the Mogul Corporation was estimating for an annual output of 3,000 tons of copper, which at present prices would provide a profit of about £1,400,000 tax free! This suggests very strongly that the leprechauns are proposing to convert some of the copper into gold, possibly as a reward to Mr. Lemass for his eloquency in the Dail.

South Africa

(From Our Own Correspondent)

Johannesburg, February 18.

Gold and diamonds undoubtedly steal most of the limelight in South African mining activities, and one tends to overlook the fact even here that the Union also has the world's largest straightforward platinum producer at Rustenburg, some 80 miles north-north-west of Johannesburg. As has been announced recently, production of the Rustenburg mine—the Main section—is to be increased by 50 per cent and that of the Union section, which lies some 60 miles north of Rustenburg itself, by 25 per cent.

Although no accurate figure for output during 1955 is yet available, it is estimated to have been of the order of 300,000 oz. When the higher rate of production now planned comes in full effect, output should be getting up towards 400,000 oz. per annum. The expansionist programme is a very substantial one and provision has been made for funds amounting to approximately £2,500,000. About half of this will be raised by share issues and the balance drawn from current profits. The current milling rate is about 1,500,000 tons a year, so that the extensions involve a major expansion on this and the mining sides as well as in the reduction and refinery departments.

STRAIGHTFORWARD GEOLOGICAL STRUCTURE

Platinum occurs in the Merensky reef which runs from Lydenburg in the Eastern Transvaal, through Potgietersrust to Rustenburg. It is in the last-named area that the values have been high enough to justify continuous operation. It is probable that the present price of the metal makes other areas look economic, but it is doubtful whether they will come into the picture for many years to come—possibly an area being investigated by Transvaal Consolidated Lands could prove the exception—in the light of the size of the Rustenburg undertaking and the problem of refining and marketing concentrates by other undertakings.

The reef lies above the chromite belt of the Bushveld Igneous Complex and has a dip of between 10 and 25 deg. Assay values are not published, but according to Government sources the Rustenburg occurrence varies between 5 and 7 dwt. over a stoping width of 30 in. A feature of the Merensky horizon is the existence of a chromite band. Where this band is thin the platinum is distributed throughout it but where it is relatively thick the pay-zone is limited to part of the band.

Geologically, the Rustenburg deposit is a textbook model, so far no major faulting has been encountered over the year and there is little other disturbance apart from a couple of dykes. Water is unknown and at the relatively shallow depth—operations at present are between 800 and 1,200 ft. —heat is no problem.

Originally, platinum was recovered from those portions of the reef that had been oxidized where the platinoid metals had been released in a finely divided form. At depth, however, they are in solid solution notably in nickeliferous pyrite, pyrrhotite and pentlandite.

On surface, the ore is screened and larger material waste sorted. The coarser material passes through cone crushers, the fines going straight to ball mills. Rake classifiers are being steadily replaced by cyclone.

A fair proportion of the mineral content is recovered by gravity concentrators and the rest by means of flotation. The flotation concentrates are smelted on the premises in blast furnaces and the product treated in Bessemer convertors, the resultant matte containing a very high proportion of nickel and copper in addition to the platinoid group metals.

No figures are available of the amount of copper and nickel being recovered, but it is considered to be substantial. Taking the current prices of these metals into consideration, the revenue accruing to the company should be more than just a sweetener.

The area currently being mined at Rustenburg is a large one, but with an eye to the future and the coming higher rate of milling, application has been made for a lease over a large area adjoining the present one in a northerly direction. All that remains is the formal consent by the Minister of Mines. When this new ground is included, it is estimated that the life of the property will be of the order of between 50 and 60 years.

RAIN AND MANPOWER

Since the beginning of the year, South Africa has been in the grip of drought and, at the time of writing, there are no signs of a break in the weather. Even if we do get good rains soon, they will not prevent a serious drop in the maize crop. This diversion into agriculture would not seem to have much to do with mining, but it is a vital factor in the native labour question. The bulk of the indigenous supply is drawn from people who farm on a subsistence basis. In years of good crops the incentive to work on the mine or in industry is not great. In bad years, however, they and their families can only exist through buying maize—the staple diet—for cash.

The latest January figure of 316,000, compared with 298,000 in December, shows that the flow to the mines is under way. It would seem, therefore, that the next few months may reflect an even sharper upsurge than last year.

It should be borne in mind, however, that this change in the situation will not be immediately shown in working profits, since it takes some time to integrate new recruits into mining operations. In the longer term, however, tonnage and profits should start rising once again.

On the European labour side, the Mine Workers' Union is protesting against the importation of recruits from European countries. They allege that these men are not colour bar conscious and by implication that they tend to work too hard. The Union goes on to say that if the mines offered higher wages they could get all the South African miners they wanted. The feeling here is that it is the last argument that is the real one. Some time back the Union attempted to limit the number of miners available, particularly for the Free State, in order to exert pressure for higher wages. This, however, came rather a cropper when Anglo American Corporation ran a series of advertisements in the popular press giving details of conditions of employment and amenities offered on the new mines. When wives of miners saw this, the Union's propaganda did not have a chance as husbands were sent hot foot to Anglo America's Johannesburg office to sign on for the O.F.S.

Expansion of the Uranium Mining Industry

The uranium industry still awaits a clear-cut decision from the U.S. Government as to procurement policy after the expiration of the present ore buying programme in 1962. The difficulties of long-range forecasting were explained by Mr. Jesse C. Johnson, of the Atomic Energy Commission, in an address to the Colorado Mining Association, on which this article is largely based.

The question mark hanging over uranium, though not dispelled, was brought into clearer perspective at the annual convention of the Colorado Mining Association, which took place at Denver early in February, 1956.

Within a remarkably short period a Free World uranium industry of major economic importance has been established. According to figures given recently by Dr. W. L. Libby, Commissioner for the Atomic Energy Commission, it is now "almost a half-billion dollar per year business" with the U.S. share about $200,000,000 a year. Production is still rising and important new sources of supply are being found.

The remarkable progress of this young industry stems primarily from the encouragement afforded to producers by the Atomic Energy Commission through its guaranteed ore buying programme, which might be said to have set the pace for development throughout the Free World. The termination date of the buying programme has been progressively extended—first to 1954 and then to 1958. Today, the programme extends until 1962. Can producers look forward thereafter to a long period of profitable operations, or will the bottom fall out of the market in 1963? Alarm was understandably occasioned by the warning given in September last year by Dr. Ralph Lapp, director of Nuclear Science Service in Washington, who stated that the U.S. stockpile of atom bombs "amounted to several tons of T.N.T. for every inhabitant of the planet," and went on to predict a sharp slump in the uranium market for weapons in the next decade.

Further cause for anxiety was afforded by the announcement of the Canadian Government that it would not provide a guaranteed market for uranium for mines coming into production after 1957. Under existing regulations, uranium companies have until March 31 this year to begin negotiations for special price contracts with the Government-owned Eldorado Mining and Refining, and must show that they can begin production about a year later. Although no extension of this time limit is expected, it is possible that there might be some concessions regarding the mills' starting time of April 1, 1957, and the contract completion date of March 31, 1962.

TRANSITION TO CIVILIAN USAGE

The crux of the problem for uranium producers is whether the present market for uranium ores, which is almost exclusively military, will hold up long enough to permit an orderly transition to the future civilian power market, which will provide the industry with a large and expanding outlet for many years to come. Clearly it is desirable that procurement programmes should be designed to prevent "boom and bust" operations by assisting producers to bridge the interim period between the decline of military consumption and the production of nuclear power on a substantial scale.

The formulation of a domestic buying programme that would not begin for another six years is obviously no easy matter. Mr. Jesse C. Johnson, Director, Division of Raw Materials, U.S. Atomic Energy Commission, told the Colorado Mining Association that the government's position regarding the buying of uranium after March 31, 1962, was not yet clear. Basically the problem was one of supply and demand, he stated. The Government must establish its requirements and make contracts and commitments to meet them.

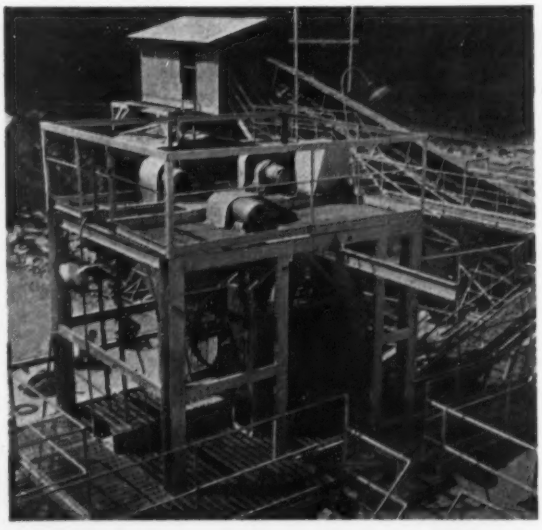
As an indication of the unpredictable changes which make it virtually impossible to foresee the exact requirements of the U.S. Government so far ahead, Mr. Johnson reviewed the progress of domestic uranium production. Approximately 80 per cent of the known ore reserves have been developed in the past three years. Most of them were discovered during this period. Ore reserves in each of three major districts—the big Indian Washington-Lisbon Valley area of Utah; the Laguna Indian reservation, New Mexico; and the Ambrosia Lake area, New York—are now measured in millions of tons. The Ambrosia Lake deposits were discovered only last summer. In 1950, there was no basis for predicting the discovery of ore deposits of such magnitude. In those days the discovery of an orebody amounting to 20,000-30,000 tons was a major event.

U.S. DOMESTIC RESOURCES

That the difficulty of equating future requirements with results of current exploration and development programmes is a very real one, can readily be understood by studying some of the papers presented by the A.E.C. last year at the Geneva Conference on "Peaceful Uses of Atomic Energy."

Most of the uranium ore mined throughout the world has come from deposits classified geologically as hydrothermal vein deposits. These deposits mainly contain the primary black uranium oxide mineral pitchblende, and are characteristically rich in grade. They have been formed by hot ore-bearing solutions rising from depth along fractures in the earth's crust and are related to igneous and volcanic activity of past geological ages.

Deposits of this type appear to be relatively common in the U.S., as in many other parts of the world. According to Donald L. Everhart, geological adviser to the A.E.C., some 200 known vein deposits containing significant amounts of uranium minerals have so far been discovered



Uranium ore being carried by conveyors through intricate sampling equipment on the Colorado Plateau.

in the U.S. They may be classified into several major types according to the metallic and non-metallic elements associated with the uranium, and the rock types that have acted as favourable hosts to the invading ore solutions. The more commercially important uranium vein deposits contain associated copper, lead and molybdenum sulphides, silica minerals, and fluorite. Other important uranium veins characteristically contain copper, cobalt, nickel, lead, zinc and silver sulphides, together with carbonate minerals. Deposits of lesser importance contain only iron oxides and silica minerals along with the uranium; consist of uranium oxides associated with gold-bearing pyrites, or are uranium-bearing hydrocarbons.

In a paper summarizing the results of a ten-year survey by more than 500 geologists, it was stated that the uranium in igneous rocks, though sparsely distributed, could with improved methods of extraction constitute a very low-grade source. The authors also laid considerable emphasis on the fact that sedimentary formations, notably those deposited by ancient streams, contain the particular physical and chemical characteristics most favourable for precipitation of uranium from solutions. Though great progress has been made in the geology of uranium, the source of uraniferous solution from which most uranium has been precipitated is still a matter of dispute among investigators.

Attention was drawn in the same paper to the importance of the Colorado Plateau—an area of about 100,000 sq. miles at the junction of Colorado, Utah, Arizona and New Mexico—as a locality where ancient stream deposits are common and from which the greater part of domestic production comes. Wyoming, Montana and the Dakotas contain similar favourable formations and recently Texas has been found to contain a considerable outcrop of rock which may yield important quantities of uranium.

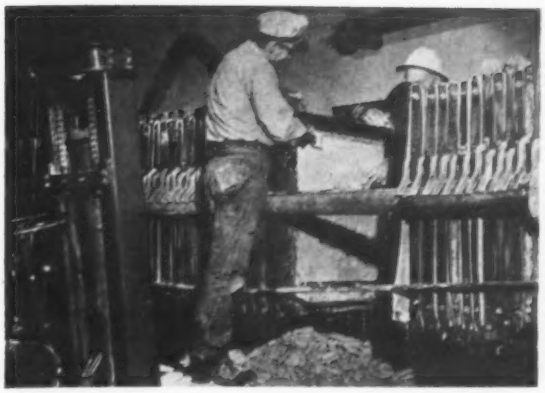
The presence of uranium in lignites of the Dakotas is thought to be proof that organic matter is capable of precipitating uranium from solutions and it has been suggested that, when milling methods have been perfected, the low-grade coals of that region will be an additional source.

Enough work has been done to show that, within its own boundaries, the U.S. has potential resources which are truly immense. In many other parts of the world intensive prospecting by modern scientific methods is also resulting in very large additions to the Free World's known reserves.

It is evident from the papers presented at Geneva that many problems require to be solved before the vast low-grade resources of the U.S. can be economically exploited, and that only the incentives afforded by an assured market at profitable prices could justify the time and cost of overcoming the technical difficulties and laying down commercial plants. What will be the pattern of discovery within the next three years? Will new ore reserves continue to be developed at the rate of the past three years, or is the U.S. entering a period when only relatively small deposits will be found? Can the technical and economic problems associated with the exploitation of low-grade occurrences be successfully overcome?

FUTURE URANIUM REQUIREMENTS

Having indicated the difficulty of forecasting long-term uranium production, Mr. Johnson went on to show that a long-term assessment of the Government's uranium requirements was equally difficult. Practically all the uranium required by the A.E.C. has been for the defence programme, which has determined both the quantity to be acquired and the rate of acquisition. These two factors—the quantity needed and the urgency for speed—have in a large measure been responsible for the pattern of uranium programmes throughout the Free World. Military requirements will continue to be the dominant factor in the demand for uranium for some time. No significant industrial requirements are expected before 1960 and probably no important requirements until after 1965. Consequently the Commission's procurement programme must continue to be determined largely by military needs.



Uranium extracted from carnotite ore mined on the Colorado Plateau being removed from a filter press

IMPORTANCE OF THE STOCKPILE

Although estimates of long-range requirements are subject to change, it is reasonable to assume that the military demand will extend beyond 1962. There is also reason to suppose, that the time may be approaching when it can be met without increasing the rate of uranium production. In this connection, it should be borne in mind that most of the fissionable material which has gone into atomic weapons is in the weapons stockpile—it has not been consumed.

Mr. Johnson considered that with the large reactor programmes now under way in Europe and the U.S., it should be possible within a few years to have more reliable forecasts of atomic power growth and, consequently, of uranium requirements. It would be desirable for the uranium and power industries to undertake a joint study of the potential uranium supply and demand, so that both industries could do sound long-range planning. For example, some reactor engineers believe that the cost and supply of uranium might determine the design of early commercial reactors and the time when commercial power can be achieved.

It is evident, of course, that before there can be public discussions of uranium production and resources, this information will have to be declassified. Uranium statistics are probably less important than formerly from a security point of view, and the time may be approaching when the veil of secrecy can be lifted to an increasing extent.

An important step taken in the U.S. last year was the declassification of information on processing uranium ores. This should be advantageous to mill operators and to those planning uranium milling operations. It should also stimulate metallurgical improvements through technical discussions and private research. Some of the uranium processes developed under A.E.C. programmes may have applications for the recovery of other metals.

Process development has been an important part of the Commission's raw materials programme. It has been instrumental in improving uranium recovery, reducing production costs, and in providing cheaper uranium for the Commission. Nearly every uranium mill constructed since 1950—in Australia, Belgian Congo, Canada, South Africa and the U.S.—uses processes developed under Commission contracts.

Mr. Johnson expressed the opinion that, in spite of its mushroom growth under pressure of a critical military programme, the uranium industry had developed along reasonably sound lines. There had been some speculative excesses, but for the most part these had been small promotional schemes for exploration and development. Wide publicity about rich strikes and sudden fortunes had served to foster uranium booms, but without the chance of a fortune there would not have been thousands of prospectors searching for uranium. But for these prospectors the important uranium deposits of the U.S. and Canada might not have been found—at least in so short a time.

The A.E.C. recognises the importance of developing reserves to assure a long-range continuing supply for the coming atomic power industry and for possible future military needs. This means that the uranium mining industry should be maintained in a healthy condition. It is considered particularly important that domestic prospecting and exploration should continue. Mr. Johnson emphasized that these objectives could only be reached if there was a long-term market for uranium.

Thus the A.E.C. clearly accepts in principle the need for safeguarding the interests of ore producers—or, at any rate, of domestic ore producers—though it has not yet reached a clear-cut decision as to ways and means.

Meanwhile the *Wall Street Journal* reports that the hectic uranium boom in the U.S. is definitely over. Small companies are said to be falling by the wayside, while major companies are absorbing the good properties. The entrance of oil companies into the uranium field was an aspect of the mining congress noted by several of the delegates at Denver.

It would appear, therefore, that the industry, having sown its wild oats, is entering upon a period of reconstruction, from which it will emerge well equipped to meet the requirements of the coming atomic age.

The Mining Industry in Morocco in 1955

At the end of 1955, the mining industry in Morocco was able to look back on a generally prosperous year, despite the political disturbances that had troubled the country. The following article discusses the highlights of Moroccan mining enterprise in 1955, and indicates that the situation may be viewed more optimistically than the general tenor of events would suggest.

Despite an extremely unstable political situation, with riots, revolts and terrorism taking a toll of over a thousand lives and causing over £1,000,000 worth of damage to mining installations, the year 1955 was on the whole a prosperous one for Moroccan mines. This was a sharp contrast to practically all other business activities where production was considerably reduced.

Last year, the French zone of Morocco exported minerals worth almost £41,000,000 which was a record figure showing an increase of £3,019,000 over the previous year.

THE STRIKE MENACE

The State Phosphate Monopoly's main mine at Khouribga suffered an estimated £1,250,000-worth of damage in August, 1955, when miners sabotaged conveyor equipment and machinery during a riot inspired by nationalist agitators. But although production at this mine was reduced considerably for a matter of six weeks, large reserve stocks enabled the Monopoly to export 5,350,000 tons, a new record and an increase of six per cent over the previous year. The Monopoly also contributed Fr.6,250,000,000 to the national budget last year.

Intermittent strikes at the Djerada anthracite mines reduced output by 21,000 tons in 1955, but the exploiting company, Charbonnages Marocaines, also experienced some difficulty in marketing the coal. New hydro-electric power plants which came into operation during the year had the effect of reducing the demand for solid fuel which in recent years has been in steady regression. In 1953, the Electric Light and Power Company of Morocco purchased 240,000 tons of Djerada anthracite, last year they took only 80,000 tons.

The European anthracite market was more or less stagnant at the beginning of the year, but when the demand increased from October onwards the Djerada miners chose this moment to go on strike.

At Morocco's most important iron mine, the Ait Amar near Oued Zem, 22 miners and their families were assassinated by Berber warrior tribesmen in August; production was held up for over a month as a consequence. Production fell from 335,000 tons to 300,000, less than half of the 1952 figure of 650,000 tons. The steady drop in output over recent years is due to the fact that it is no longer possible to extract the ore by open cast mining methods so that galleries have to be excavated. In addition, the operating company is experiencing increasing difficulty on the world market where demand is falling.

Production of lead and zinc, however, both showed increases. Lead ore output was 10,000 tons more than in 1954 with 125,000 tons of concentrates, while zinc rose by 14,000 tons to 77,000 tons. This increase is largely due to the expansion and re-equipment of the Zellidja mines.

Lead and zinc prospects for 1956 are good. The Djebel Aouam lead mine between Khenifra and Azrou turned out 700 tons of concentrates in 1954, 1,500 tons last year, while this year output is expected to be doubled again until 1959 when total production of concentrates is expected to reach 12,000 tons. The Djebel Ketem lead mine also recorded similar progress from 550 tons in 1954 to 1,500 tons last year. Finally, the Tissili N'Roumi lead mine near Ksiba increased output from 1,200 to 1,500 tons.

Production of petroleum also was on the decline, 103,000 tons last year as compared to 118,000 the previous year.

GENERALLY FAVOURABLE OUTLOOK

A favourable movement in prices of both metallurgical and chemical manganese enabled several small marginal mines to continue their activity during the year under review, although the improvement was not sufficient to allow other mines to reopen. Exports of Moroccan manganese reached 415,000 tons, as against 400,000 tons in 1954, nearly 75 per cent coming from the Imini mine in the High Atlas and the bulk of the rest from Bou Arfa in Eastern Morocco.

The Tiouit gold mine, in the Djebel Sarro on the doorstep of the Sahara, increased production from 130 to 140 kg. The operating company will undertake a new prospecting programme in the area in 1956 in the hope of extending the workings. However, the veins being worked at present assure a regular production for several years to come.

The price of cobalt having been maintained more or less at the 1954 level, production at the mines of Bouazzer and Graa rose slightly to 7,200 tons last year, whilst total output from Moroccan antimony mines was stable at 600 tons.

LABOUR FOR SOUTH AFRICA'S GOLD MINES—II

Increasing Labour's Efficiency

In the following article our Joint Editor, Mr. U. Baliol Scott, concludes his survey of the outlook for the supply of labour in South Africa's gold mines based on impressions collected during a recent visit to the Union. As we pointed out last week in introducing the first part of this survey, these two articles have unfortunately had to be compiled without the benefit of the considerable expert knowledge of the subject possessed by the Chamber of Mines but which that body felt unable to make available to us. In the interests of accuracy, we shall nevertheless be glad to publish any comment or further information which the Chamber may on reflection care to make available. Meanwhile, the facts and conclusions in this article have, of course, been verified within the limit which was possible in the circumstances.

The conclusion reached in the first portion of this article was that at any rate over the next five years, and probably for longer, the demand for labour on the gold mines of South Africa was likely to be uncomfortably in excess of supply. The immediate bottleneck was seen to be in the supply of European miners and artisans, but once this problem had been resolved, the shortage of native labour would become "effective," and might prove to be the more difficult to solve.

Given adequate European labour, overall native labour requirements would rise by a minimum of 5,000 by 1960. While not large in itself, this net figure disguises the fact that it was arrived at on the basis of calculations pointing to a *certain* increase of 40,000 in requirements from the developing mines against only a *likely* reduction of 35,000 in the requirements of the old and marginal mines. The basis of these calculations was, if anything, optimistic in that they assumed a high underground efficiency in the new mines (40 tons per native per month against the present average of around 25 tons in the O.F.S. developers), coupled with the closing down of old and marginal mines equivalent to the elimination of a monthly mill feed of 750,000 tons.

Such a loss of output may in practice not eventuate; moreover even if it does, it may not develop to any extent during the next year or so, yet during this period the requirements of the developing mines will be growing rapidly—say of the rate of 8,000-10,000 a year. Such an increase, without some corresponding relief from shutdowns, is unlikely to be achieved. We have therefore to consider whether other factors exist, which might mitigate an otherwise uncertain prospect. Fortunately they do.

BETTER TRAINING AND MANAGEMENT

In the first place considerable progress has been made towards the more efficient utilization of native labour, partly through mechanization, but more significantly (and, in the main more recently) by better planning of work, by better training of both native and European miners and of supervisory staff, and by better man management. Not only have significant results already been achieved (witness the increase in the average productivity of the industry from 27½ tons per native per month in 1946 to just over 33 tons in 1953—an increase of 20 per cent in seven years), but there would still appear to be scope for considerable further improvement in these figures. Indeed, it is in the direction of improved training and management techniques that the greatest hope lies for staving off the labour shortage.

Aside from improvements due to better training and management methods, it is possible that a revolution in blasting technique, and consequently in ore handling, may be on the way. It has already been practically demonstrated at one mine that, given favourable conditions, it is possible (and safe), by considerably lengthening blast holes beyond the 3 ft. 6 in. now conventional on the Rand, to break up to 500 tons of rock at the stope face at one blast, that is to say about four times the best tonnage achieved under present normal practice. Even allowing that increases on this scale may not be possible where any considerable degree of selective mining is necessary, yet, if results only half as good as this could be achieved on average, an entirely new situation would arise as regards ore handling technique and consequently as regards output per manshift.

CONSEQUENCES OF NEW BLASTING AND ORE HANDLING METHODS

With much larger tonnages coming from one stope face, it becomes possible to concentrate a smaller labour force in fewer stope areas, and yet (using more highly mechanized ore handling methods) to maintain the same rate of mill feed. Moreover a greater degree of mechanization (perhaps to the extent of introducing power loaders at the stope and conveyors on main haulages) becomes economically justifiable once it is established that the volume of rock broken in one section of the mine can be maintained at, say, double its present rate.

The circumstances of individual mines differ so widely that it is impossible to indicate the potential saving to the industry as a whole from the development of such methods. In the instance just cited (admittedly a favourable one), it has, however, been estimated that, given the necessary expenditure on replanning the layout of the stope area to accommodate power loaders and on installing main haulage conveyors, it might be possible to cut the labour force by over 80 per cent and still maintain the present rate of output. Incidentally the cut-back would be relatively greater in native than in European complements, as a higher ratio of supervisory and maintenance staff would be required to ensure the smooth operation of the more mechanized layout.

THE CASE OF THE OLDER MINE

The industry as a whole, however, can hardly anticipate economies on this scale and, in the case of the oldest mines, it would anyway not be economic to incur the considerable capital expenditure involved in replanning a mine which, at best, may have only a few years' life remaining to it. Economies from the use of more efficient training and management techniques are, however, open to everyone and this is undoubtedly a factor to be taken into account in assessing the ability of the older mines to survive. It is true that some of the very old mines are reaching a state of absolute exhaustion. These are the mines which would long since have died but for the devaluations of 1931 and 1947, which made it possible to rework large areas previously below the pay limit. Even so, there comes a time when such mines will no longer respond to further increases in the gold price or reductions in costs and several are reaching that point.

On the other hand there are a greater number of mines which, although operating on a dangerously small profit margin, still have sufficient ore reserves to enable them to take advantage of higher operating efficiencies. Of the 20 odd mines now operating at a working profit from gold of

less than 3s. per ton, probably some two-thirds come into this latter category.

These greater efficiencies would certainly result in the release of some labour (assuming that development programmes were already well ahead of the mill and that mill throughputs could not be increased either directly, or else indirectly through hand sorting), but, of course, nothing like so large a number would become available as if the mine closed down altogether, which, on present cost trends a number are in danger of doing, whether fully mined out or not.

Thus while some economizing of labour should in any case occur among the old mines it would be a mistake to place too much reliance on the early demise of the marginal mine, even in those cases where the grade is so consistent as to allow little scope for raising the pay limit. It would therefore seem that the only sure salvation of the developing mines lies in their own efforts at maximizing labour efficiencies, by better training and management techniques and, where technically practicable, by more mechanization than on the established mines.

REDEPLOYMENT OF EUROPEAN LABOUR

In passing, it should be pointed out that, so far as European labour is concerned, the closing down of an old mine cannot be counted as pure gain—more especially in the case of artisans who are in particularly short supply. Because, for example, an electrician or a carpenter loses his employment at a mine on the East or Central Rand, it by no means follows that he will seek employment on another mine, especially if he is near retirement age. Indeed, a problem which is very much exercising the present government is how to avoid a major disruption to the local economy of towns on the Reef threatened by imminent mine closures, and efforts will undoubtedly be made to stabilize the population of such towns as Benoni, Springs and Randfontein by substituting new secondary industries. Moreover, even without such opportunities for changing his job without moving his home, the artisan—once the personal habits and the ties which held him to a particular mine are broken—may well be attracted to another industry where conditions of work, if not of pay, are preferable.

ARE WAGE RATES A FACTOR?

This consideration brings us to another imponderable in the labour equation; namely, to what extent would an increase in wage rates be effective in attracting more labour and, what is perhaps more to the point, to what extent can the mines afford such increases?

As regards native labour, it is doubtful whether wage increases could achieve much except perhaps in the purely negative sense of arresting the drift of the Union native away from the industry. Already the relatively higher native wage structure in the Union means that for the great majority of natives coming from outside the Union existing rates are already attractive enough and, as already shown in the previous article, the causes inhibiting higher recruitment lie elsewhere.

Unfortunately we have no data to hand showing the present differential between mining and industrial earnings of Europeans. It would, however, be surprising if the European labour position on the mines could not be improved by higher wages or wage equivalents. Indeed on the newer mines in the Klerksdorp area and on the O.F.S. this is already happening indirectly in the form of subsidized housing, and attractive health and social services. In this way the competitive pressures on the labour market have in part been met without any outward disturbance of the present Chamber of Mines wage structure.

The desirability—and indeed the practicability—of paying higher wages varies widely from mine to mine—all the way from the marginal mine (which would simply run at a loss if rates went up without a corresponding improvement in efficiencies) up to the developing mine with high costs per ton which could be reduced if more labour was available to deliver a higher tonnage to the mill. There is, however, little doubt that on this issue the majority view on the G.P.C. would be against increases gratuitously offered for the sake of improving the industry's competitive position in the labour market. Certain labour cost increases have proved inescapable (e.g., the recent negotiations with the European mineworkers which resulted in wage increases equivalent to an average of about 4d. per ton overall). In these circumstances it is hardly likely that the G.P.C. would agree to further gratuitous increases.

SMALL SCALE MINING

One further possibility remains which might prove in some cases to be a workable compromise between the premature closure of an old mine and the continued tying up of large numbers of sorely needed men in the mining of very big tonnages, from which the shareholders may now be getting little if any return.

Some mining engineers in Johannesburg believe that the managements of declining mines are apt to remain too tonnage minded beyond the stage where tonnage is necessarily the over-riding consideration. The shareholder who gets no dividend (or at best a few pence) on the monthly mill throughput of 50,000 or 100,000 tons may well feel himself worse off than if he were receiving perhaps a shilling dividend from the same property worked as a highly selective small scale proposition, even though the remaining life of the mine were to be much reduced in consequence. What, after all, does the shareholder in a declining mine look for? It must be assumed he has amortized his initial investment out of the distributions of earlier years and that short of a rise in the gold price his share is no longer likely to yield him any capital gains. In due course he may hope for repayment of capital, and if his present dividend is negligible he would probably welcome this repayment sooner rather than later, especially if it could be sweetened by previous enhanced dividend distributions which would in effect be the outcome of overmining. (Admittedly there will be cases where such overmining would be impossible because the mine had no higher grade ore.)

In point of fact one or two mines are now trending towards a small scale basis of operation and it might well be advantageous for others to do so, especially if some method could be found whereby they could sell their redundant portion of their labour quota to one or more of the developing mines. Very possibly the present method of operating the quota system would make this impossible, but circumstances alter cases and it would not be the first time in the history of mining that quotas have been traded. Tin production quotas were bought and sold in Malaya during the pre-war period of tin restriction and a modified system of trading in quotas within any given group of companies is again to be introduced in Malaya with the coming of the International Tin Agreement. If production quotas, why not labour quotas?

Admittedly the position of the Government Mining Engineer has to be considered in all this. His present mandate is to protect the State against loss of gold production through overmining. At the same time if a position were reached where the whole development of the Klerksdorp and O.F.S. fields was being adversely affected by the labour shortage, it might well be that the wider national interests would be better served by some relaxation of this hitherto inflexible directive.

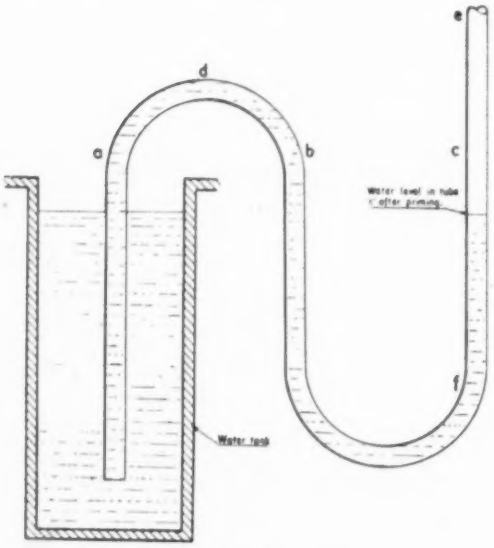
MACHINERY AND EQUIPMENT

Ever-Priming of Horizontal Centrifugal Pumps

A method of keeping a horizontal centrifugal pump constantly primed has been devised in the Northern Division of the N.C.B. The device delivers the water through a tube which forms an inverted siphon. The effect of this is to keep the pump constantly primed enabling it to be used intermittently without the need for continual attendance by an operator.

In the sketch, the inverted siphon is shown upon which the idea is based. A flexible tube (abc) is filled with water, the end (a) being submerged while the end (e) is kept sealed until it is formed into the inverted siphon shown. When the siphon is formed the water level in leg (c) will fall to the level of the water in the tank.

If a centrifugal pump is inserted at any point in legs (a) and (b) and say at (d), it can be used to expel the water from the tank. When the pump is stopped the water in leg (c) will fall to the level of the water in the tank; so long as the level does not fall below the point (f) the siphon and pump will remain primed. An essential feature of this method is the continuous water sealing of the pump glands.



The Inverted Siphon

It is claimed that by this method a pump can be operated automatically, by float control, by remote manual control, or by time clock, producing a saving in operating labour costs and obviating the necessity of buying new pumps when automatic operation is required.

New Development in Tracked Loaders

In December, 1954, Eimco (Great Britain) Ltd. completed the first prototype of the electric-driven Model 621 Loader, a machine embodying certain new principles of construction previously untried on this type of equipment. The first five machines of the full production unit were subsequently tested underground for six months in the anhydrite mine of Solway Chemicals Ltd. at Whitehaven, where the operation is described as one of the most arduous in the U.K. As a result of these trials, minor modifications have been made to the unit and negotiations have been opened with the Ministry of Mines for the granting of a flameproof certificate.

The Model 621 E. Loader is claimed by the manufacturers to be an answer to the existing trend towards trackless mining. The machine will be the subject of a subsequent article in *The Mining Journal*, wherein the Whitehaven operation and the applications of the 621 E. will be fully described.

The 621E unit in operation at Whitehaven

The 621 E. is basically similar to the air-driven loaders manufactured by Eimco, and figures available from the Whitehaven site indicate that an output of 500 tons from a loader in one eight-hour shift is obtainable. The loaders may be spun by the reversed track operation.

A Dry-Chemical Fire Extinguisher

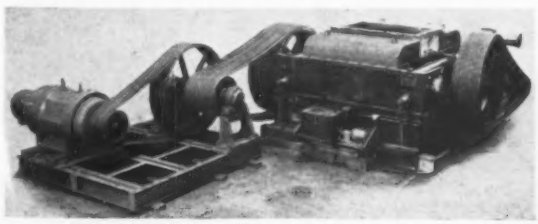
A new pressure-operated dry-chemical fire extinguisher which weighs less than 10 lb. when fully charged, is now being manufactured by The Pyrene Co. Ltd. The extinguisher has been designed to meet the need for a small, yet powerful fire smothering unit to deal with outbreaks involving petrol, oils, paints, spirits, solvents, greases, etc. It can also be used with safety on fires involving electrical equipment. Charged with 5 lb. of dry chemical powder, the extinguisher is pressurised with nitrogen up to 150 lb. per sq. in., although it will still operate satisfactorily at pressures as low as 100 lb.

New Range of Double Roll Crushers

An addition to the BJ-D range of crushers was recently announced by British Jeffrey-Diamond Ltd. It will be recalled that the machine, designated the Double Roll Crusher, was inspected by a representative of *The Mining Journal* earlier this year. On that occasion the first production model was on view, a 48 in. by 60 in. unit for very heavy duty completed and ready for export to the Central Provinces Manganese Ore Company's plant at South Triodi, Madhya Pradesh, India.

The British Jeffrey-Diamond Double Roll Crusher is manufactured in four sizes, namely 30 in. by 36 in., 30 in. by 48 in., 42 in. by 48 in., and 48 in. by 60 in. In all these dimensions the former denotes diameter and the latter the width of the roll.

At the time our original description of this unit was published (this column, January 13, 1956) it was announced that constructional details revealed the large diameter shafts to be equipped with heavy bronze bearings with motorized forced feed grease lubrication. The decision has now been taken to change to force feed lubrication.



The BJ-D double roll crusher

MINING MISCELLANY

The Boliden Mining Co. has decided to build a new copper works adjacent to its present plant at Rönnskär in North Sweden. It is estimated to cost about Kr.14,000,000 (£965,000) and will be completed in about two years. The works is planned for an annual output of 30,000 tons.

* * *

Following the recent development of the Udy process for the economic treatment of low-grade manganiferous ores, Strategic-Udy Metallurgical and Chemical Processes is planning to start construction soon on a million dollar electro-metallurgical plant near Niagara Falls, Ontario.

* * *

In Peru the functions of the Radioactive Substances Control Board have been taken over by the newly constituted Atomic Energy Control Board (Junta de Energia Atomica). The Address of the Board is unchanged, but the Director, Colonel Sarmiento, has been promoted to General.

* * *

An important tin ore deposit has been discovered at Tambillo in the province of Huaraz, some 200 miles north of Lima, and by the middle of December, 1955, claims covering a total of 30,000 hectares had been registered. This is the first deposit of tin-bearing ore to be found in Peru and its mineral content is said to vary between 10.85 per cent and 9.75 per cent.

* * *

The Johns-Manville Corporation is reported to be considering entering the gypsum business. The firm has signed an option on a large gypsum deposit between Las Vegas and Henderson, Nevada, and its exploration department is examining additional gypsum deposits in other parts of the country. Diamond drilling and trenching will shortly be started on the Nevada property.

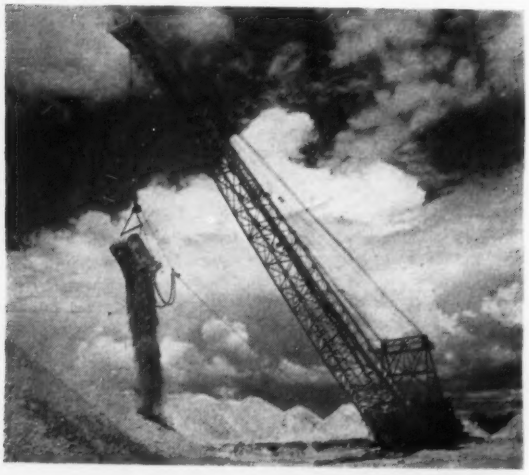
* * *

Britain is making a big effort to capture the Malayan and other world markets for earth-moving equipment, states the U.K. trade commissioner, Mr. S. C. Stout. Tractor manufacturers are increasing their range of models to suit the needs of particular areas. Malayan imports of British earth-moving equipment rose in 1955, to over 4,500,000 Malayan dollars from 4,000,000 dollars in 1954. The tractor has proved invaluable in development work in Malaya and Borneo, and more and more excavators are being ordered by owners of large open cast tin mines.

* * *

An oil shale mine at Rifle, Colorado, owned by the U.S. Government, is to be converted into a laboratory for mining research. The Bureau of Mines has stated that it will use a $1,000,000 appropriation for research in rock movement, ventilation, drilling, blasting, automation and related studies. Safety will be one of the chief considerations in planning the research programme at the mine. No completely new integrated system of mining is likely to be developed at Rifle, but it is hoped that the work will lead to the development of safer and possibly cheaper methods of mining oil shale.

* * *



Opencast bauxite mining operations in British Guiana. This photograph is one of nine in full colour published in the poster on the territory published by H.M.S.O. at 1s. 6d.

Miners working at Rudabánya, Northern Hungary, have found shafts of a copper mine believed to be 500 to 600 years old. Archaeologists are collecting old tools and other mining equipment from it for exhibition in museums.

* * *

Kamativi Tin Mines, Ltd., a Dutch financed company carrying on operations in the Gwaai area, S. Rhodesia, have increased their authorized capital from £700,000 to £3,000,000. The new money will be used to bring the milling rate up from the present total of about 600 tons a day to 1,000 tons a day later this year and also to cater for future expansion. The principal shareholders are the Billiton Company, of The Hague, Netherlands. A wholly owned subsidiary company called Kamativi Smelting and Refining Company was formed in 1955. Its smelter, which was completed last year, produces ingot tin of high purity. High quality solders and white metals are made for local consumption. Production of tin concentrates began in May, 1955, and has averaged about 35 l.tons monthly. It will be higher this year.

PERSONAL

Mr. Donald C. Altman, Manager for the Industries Group, Allis-Chalmers Great Britain Limited, was elected to the company's board of directors at the annual meeting on December 30, 1955, in Milwaukee, Wisconsin.

* * *

Austin Hopkinson and Co. Ltd., Mining Engineers, of Audenshaw, Lancashire, England, designers and manufacturers of the Pikrose range of mining machinery, have announced the establishment of an export division in Paris. This is now in operation and will be managed by Mr. Guy Drury Baker.

* * *

Huntingdon, Heberlein and Co. have now moved to Simon House, 28-29 Dover Street, London, W.1. Telephone : Hyde Park 8191. The company's former address was 114 Cromwell Road, London, S.W.6.

* * *

Mr. Rupert Myers, Professor of Metallurgy at Sydney University, has announced the production of pure uranium in Australia from uranium ore.

* * *

The Exports Credits Guarantee Department announces the retirement at the end of March of Mr. G. A. Fitch, C.B.E., director of its Medium Term Underwriting Division. He will be succeeded by Mr. J. J. G. Smith, at present director of E.C.G.D.'s General Division.

* * *

The Niagara Frontier section of the American Institute of Mining and Metallurgical Engineers will hold an important conference on reactive metals at the Hotel Statler, Buffalo, on March 19-21. Among the metals discussed will be columbium, tantalum, beryllium, vanadium, rhenium, molybdenum, titanium and zirconium.

* * *

Professor G. B. B. M. Sutherland, Sc.D., F.R.S., Professor of Physics and Director of the Biophysics Research Centre in the University of Michigan, has been appointed Director of the National Physical Laboratory. It is expected that he will take up the appointment in September next.

* * *

The Gold Medal of the Mining and Metallurgical Society of America was presented to Mr. Louis S. Cates at the annual dinner meeting, of the Society, held in New York City on February 9. Mr. Cates spoke on "A Résumé of the Early Days of Porphyry Coppers." This was the first Medal presentation since 1938.

* * *

The National Western Mining Conference was held at Denver, U.S., on February 2-6, 1956. Much of the agenda was devoted to the uranium industry.

* * *

In April last year Head, Wrightson and Co. Ltd., of Thornaby-on-Tees, announced the purchase of Colliery Engineering Ltd., of Sheffield, whose work was closely allied with the existing Colliery Equipment Division. A new subsidiary company has now been formed, namely Head Wrightson Colliery Engineering Ltd., which started operating on February 1. The new company, with registered offices at Teesdale Iron Works, Thornaby-on-Tees, will have technical offices at Thornaby-on-Tees and Sheffield, and will be able to handle complete surface reorganization of new projects. In particular, Thornaby will handle skip winding installations, towers and headframes and all surface equipment including civil and electric work, while Sheffield will deal with complete coal preparation plants.

METALS, MINERALS AND ALLOYS

COPPER.—As was to be expected, last week's 3 c. rise in the U.S. domestic producer's price was followed on Monday of this week by a £25 increase in the R.S.T. price which now stands at £385 per l.ton. The R.S.T. price has now remained substantially below the L.M.E. price for so long that when the latter does eventually dip sharply, as surely it must, we may expect a period during which the R.S.T. price will be above the market. This will be the time to test the loyalty of those consumers who have been benefiting from the R.S.T. price policy this past year. Meanwhile, there are persistent rumours from across the Atlantic that the Chilean Government is going to press for the full 5 c. increase in the U.S. producer's price, which was originally requested. Many people seem to expect a further early rise to the 48 c. level.

Elsewhere, our London Metal Exchange correspondent makes the interesting comment that a narrowing of the gap between the U.S. fixed price and the market price might well be the preliminary to a general recession in prices. In other words if the American producers are prepared to follow the market, and the market realizes this, we may see an end to London reacting upwards to every fixed price increase. So long as London knows just how much the American producers are prepared to raise their price, the market can always keep one jump ahead. Once this certainty is removed we may see an end to leap-frogging and a return to more realistic values. Anyway, London is quite as justified in arguing that it is the American producers' abortive attempts at price fixing which have been forcing up the L.M.E. price as it is for New York to complain that they are having to raise their prices because of unrealistic prices at Whittington Avenue.

Certainly all concerned are increasingly anxious to see copper prices much lower and if American producers were to become convinced that the quickest way of bringing this about would be to sell their own production at the market, it would be madness for them not to do so. Reporting the general alarm at mounting prices, the *Wall Street Journal* comments again this week on the greater use of aluminium and plastics in place of copper and observes that substitution has accelerated noticeably since the price moved up from 36 to 46 c.

Recent estimates from the U.S. Copper and Brass Research Association as to the prospective rate of growth of Free World mine production compares very closely with similar estimates made by Mr. Prain last November. Mr. Prain, it will be recalled (*M.J.*, December 2, p. 656), estimated that expansions at existing mines and the coming into production of new mines would by the end of 1957 have provided an additional 426,000 tons capacity per annum. By comparison C.A.B.R.A. estimates new additional capacity this year at 229,500 s.tons, next year at 105,500 s.tons and in 1958 at 123,600 s.tons. A total of 458,600 s.tons (i.e. 410,000 l.tons as compared with Mr. Prain's 426,000 l.tons).

Mr. Prain's estimates are thus somewhat optimistic in that while the tonnage increase in both cases are similar he expects the increase to be achieved somewhat more rapidly. Remembering that strikes accounted for about 140,000 tons of lost production in 1955 it is clear that barring strikes the industry is, two years from now, going to have to absorb at least another 500,000 tons of new metal per annum. Anybody who wishes to bull that lot at present prices is welcome!

LEAD AND ZINC.—The G.S.A. has called for its usual monthly tenders for lead and zinc but only small quantities are expected to be offered to the stockpile.

In the States, lead has been selling steadily at 16 c. as well as at average prices. The New York price has, however, showed no signs of being influenced by continued firmness in London, although the latter price has at times favoured shipments of Mexican lead to Europe rather than to the States.

Shipments of lead to U.S. domestic consumers in January total 49,746 tons compared with 40,451 tons in January a year ago. Shipments of replacement batteries in the States in January are reported at 2,016,000 units compared with 1,478,000 units in January, 1955.

Zinc has been moderately active at 13¼ c. East St. Louis. The special high grade position is reported a little easier although demand is still active despite the falling off in demand from the car industry.

TIN.—It is to be hoped that the recent gymnastics of the tin price, reported in our London Metal Market column, have not induced the latest spasm of Indonesia's procrastination over the ratification of the I.T.A. Although the necessary domestic legislation has been passed, the official inauguration of the International Tin Council still awaits the deposition in London of Indonesia's signature to the Agreement, and it is odd that the signatures of the necessary Ministers cannot be obtained, wherever these gentlemen may happen to be at the moment. It would certainly be most unwise for any producing country to count on tin remaining at its present level in the absence both of the I.T.A. and the Texas smelter offtake. If Indonesia is still hoping that the latter will be kept in commission on the same basis as at present, then the sooner Washington makes its intentions clear beyond all doubt, the better.

Indications from Malaya this week are that the strike of tin miners, which have been threatening there during the last few weeks, has now been averted, at any rate for the moment, as the result of the Union having agreed to the resumption of negotiations. The outcome is, however, by no means assured yet, especially as many observers on the spot seem to feel that the strike is primarily a political manœuvre under Communist inspiration. This being so, whether a stoppage eventually occurs or not, may bear no relation to the commonsense realities of the situation.

January's tin output in Malaya was a record at 5,531 tons—26 tons more than the previous post-war record in August last. 786 mines were operating in the Federation in January—five more than in December.

Tin mill shipments in the States are reported as exceptionally good for the time of the year, and a high level of activity seems assured, at any rate into the third quarter. Higher prices are being talked of, although these may not eventuate until this spring's Steel Union wage demands have been negotiated.

ASBESTOS.—World interest in South African fibres is increasing. Demand was at a high level during the latter part of 1955, a notable feature of the year's operations being the growing importance of Cape Blue. Demand for this type of fibre is reported to be twice the current production rate and has spilled over into the market for Transvaal Blue. This is attributed to the effects of a publicity campaign undertaken by Cape Asbestos Ltd. in the U.S. and elsewhere. The adjustment and consolidation effected in 1954 were reflected by limited expansions and a considerable amount of standardization, which had favourable effects on production last year. The main problem was to meet contract tonnages and delivery schedules, many of which had fallen behind due to bad weather during the summer. Throughout the year prices remained fairly constant at levels which gave little margin for absorbing rising costs. Higher wage demands from both European and African labour, increased railway rates and the application of the Silicosis Act to asbestos mines had to be offset by raising the grade and increasing production. *Asbestos* reports that many South African producers had contracted to sell their 1956 production at existing prices before the higher level for Canadian fibre prices was announced, and will, therefore, gain no immediate advantage from the forthcoming price advances.

After completing a record year of production and shipments, Canadian fibre producers are experiencing the usual seasonal reduction in demand. It is expected that in February and March monthly shipments will be from 20 per cent to 25 per cent lower than during the peak months of last year. The continued boom in construction and the high level of activity in the automotive industry are regarded as promising a stable market for some time to come. Nevertheless Canada is facing growing competition from the Soviet Union in European asbestos markets. Mr. A. L. Penhale, president of the Asbestos Corporation, told the Royal Commission on Canada's economic prospects that Russian asbestos was selling in France, Belgium, Sweden, and a number of other European countries.

DIAMONDS.—Hope, wishful thinking, deception and fear were the background of the diamond market in 1955, states the annual report by J. K. Smit and Sons Ltd. The U.S. uses at least 70 per cent of the production of industrial diamonds and the rest of the world 30 per cent or less. In cuttables the figures are 75 per cent and 25 per cent. In the last two months of the year purchases from behind the Iron Curtain created a very firm market, especially in Europe, where the goods disappeared through unofficial channels. Prices are bound to be affected when two great powers are in the market at the same time. The effect is that the value of industrial diamonds rose steadily during the year, prices on the European market being approximately 10-15 per cent higher than in the U.S. Toolstones, especially the current sizes of 1½-3½ ct., are very scarce in all qualities in the sharp-pointed stones which are mainly required. There is less scarcity in the small diamonds used as

drilling material since by far the greatest production, especially in the Gold Coast, consists of smaller stones. The world consumption of drillings is 2 to 3 million carats. Prices of carbons have not gone up although the demand has been higher, notably in the oilfields, where carbons gave much better results.

GERMANIUM.—From an obscure element of scientific interest germanium has graduated into a material of key importance in the manufacture of guided missiles, transmitters, radar, electronic data machines, time instruments, telephonic communications and television. British railways are reported to be considering the use of germanium rectifiers in place of existing types of mechanical or mercury arc devices for the conversion of A.C. into D.C. for driving electric trains. A special factory for the manufacture of these rectifiers is being built for B.T.H. World interest in germanium is opening up new sources of supply for this rare element, which is likely to be required in progressively larger quantities. Methods developed on a laboratory scale by the U.S. Bureau of Mines promised to increase the recovery of germanium from zinc concentrates. A further source of supply is foreshadowed by the announcement that a germanium oxide process has been successfully worked out by Darmond Mining and Smelting Corporation of Rosamond Kern County, U.S. Ores mined by the Darmond firm contain from 2 to 10 lb. of germanium per ton and sufficient reserves are said to be available for a long period of operation.

MANGANESE.—As part of its long-range efforts to reduce U.S. dependence on foreign sources of steel, the Bureau of Mines has succeeded in making standard ferromanganese from Artillery Peak, Ariz., ore by concentration, sintering and electric furnace melting. It is noteworthy that last year the output of high grade manganese ore from U.S. mines reached a total of approximately 300,000 s.tons. This figure is almost 50 per cent higher than the 1954 output and nearly three times the annual production rate in 1951, when G.S.A. was authorised to purchase domestic ores at stated prices over a period. There is no doubt that the domestic ore purchase programme has met with considerable success and legislation extending it will assuredly be revived by Congress. Government-sponsored research on new processes for utilization of low-grade manganese ores or open-hearth slags virtually marked time in 1956, due to changes in the procedure for approving contracts or extensions of old projects, but further progress in this direction can be anticipated during the current year. Expanding requirements of the steel industry raised consumption of manganese in the U.S. to a new high level substantially above the 1953 peak of 2,254,000 s tons. Following the decline in 1954, imports rose sharply but not enough to keep pace with the rapidly growing demand.

PLATINUM.—Despite the tight supply position resulting from the high level of demand, notably from the oil and chemical industries, the two major suppliers of platinum to the U.K. market have consistently followed a policy of price stabilization. Although they have now advanced their prices from £32 10s. to £34 per oz., the latter figure compares with a current free market quotation of £41.

In the U.S. primary sellers are still quoting $97.99 per f.oz., at which level they are meeting the immediate requirements of their well established industrial customers. Dealers' prices are now indicated at upwards of $107, however, with offerings as high as $112 more common than previously. Continental offerings are restricted and frequently at unrealistically high rates. Recent rumours of Russian offerings around the official sellers' rate remained unconfirmed and were not given much credence by the trade.

The London Metal Market

(From Our Metal Exchange Correspondent)

For the first time for many months tin has stolen the limelight on the Metal Exchange this week with £900 per ton being paid for metal for nearby delivery, although strangely enough cash metal never changed hands at this figure. The rise was partly technical and partly due to fears of a strike in Malaya, but at the time of writing both these appear to be lessening and the price has fallen back accordingly, although opinion is that another rise in price cannot be precluded.

It seems possible that the high price in London may attract tin eastward across the Atlantic, more especially so as during recent days the arrivals of tin in New York appear to have been far more than consumer demand would absorb. The backwardation spread to an alarming figure on Monday when it reached £65 per ton, but this situation soon eased although the present backwardation is still excessive and is likely to remain so until more tin is forthcoming from producer sources. On Thursday morning the Eastern price was equivalent to £795 per ton c.i.f. Europe.

Although interest in the copper market has been great, price fluctuations have not been out of the ordinary with the backwardation remaining fairly constant. Stocks on Monday showed very little change from the previous week, but it is understood that a fair tonnage is earmarked for export in the near future and it may be that the figure will be substantially reduced in the coming weeks. There is talk of the American producers raising their price further and during the week the R.S.T. basis price has been raised to £385 per ton c.i.f., but the gap between these prices and that of premium copper has tended to narrow and it may be that the time is approaching when a more or less uniform price will be established. Should this take place it may be the signal for a general recession in prices in view of the known preference of all sections of the trade for a lower level.

Lead showed firmness over the weekend, but subsequently tailed off in spite of there being a fair demand for nearby metal which was only met with difficulty: it seems that the next few weeks will see a continuance of this situation in view of smaller arrivals from Australia and the realisation that the recent dock strike there will undoubtedly cause difficulties later on.

The zinc market has been featureless although turnovers have remained satisfactory.

Closing prices and turnovers for six days are given in the following table :—

	February 22		March 1	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Copper				
Cash	£417	£417½	£422	£423
Three months	£405	£406	£410	£411
Settlement	£417½		£423	
Week's turnover	5,300 tons		6,525 tons	
Tin				
Cash	£820	£825	£830	£835
Three months	£777½	£782½	£787½	£790
Settlement	£825		£835	
Week's turnover	400 tons		1,130 tons	
Lead				
Current half month	£121	£122	£122	£122½
Three months	£117½	£118½	£117½	£118
Week's turnover	4,250 tons		9,075 tons	
Zinc				
Current half month	£102	£103	£101½	£102
Three months	£98	£98½	£98½	£98½
Week's turnover	3,775 tons		4,025 tons	

OTHER LONDON PRICES — MARCH 1

METALS

Aluminium, 99.5%, £179 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60% basis) 23s. 6d./24s. 6d. nom. per unit, c.i.f.
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 12s. 0d. lb.
Chromium, 6s. 11d. lb.
Cobalt, 21s. lb.
Gold, 249s. 1d.
Iridium, £29/31 oz.
Manganese Metal (96%-98%) £269 according to quantity
Magnesium, 2s. 4d. lb.
Nickel, 99.5% (home trade £519 per ton
Osmium, £24/27 oz. nom.
Osmiridium, nom.
Palladium, £8 0s./£8 10s. oz.
Platinum U.K. and Empire Refined £34 0s. oz. Imported £39 0s./£41 0s. oz.
Rhodium, £40/£42.
Ruthenium, £16/£18 oz.
Quicksilver, £86 10s./£87 10s. ex-warehouse
Selenium, 112s. nom. per lb.
Silver, 78⅛d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth	65% 8s. 6d. c.i.f. 18%/20% 1s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semi-friable) 48%	£15 2s. 6d. per ton c.i.f.
,, Refractory 45%	£14 2s. 6d. per ton c.i.f.
,, Smalls 42%	£12 2s. 6d. per ton c.i.f.
Magnesite, ground calcined	£27 10s./£28 10s. d/d
Magnesite, Raw	£11 10s./£12 10s. d/d
Molybdenite (85% basis)	8s. 2½d. nom. per lb. c.i.f.
Wolfram and Scheelite (65%)	267s. 0d./275s. 0d. c.i.f.
Tungsten Metal Powder (98% Min. W.)	21s. 4d. nom. per lb. (home)
Ferro-tungsten (80%-85%)	18s. 4d. nom. per lb. (home)
Carbide, 4-cwt. lots	£39 3s. 9d. d/d per ton
Ferro-manganese, home	£59 10s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) basis 125s. freight	100d./102d. per unit c.i.f.
Manganese Ore (43%-45%)	95d./97d. per unit c.i.f.
Manganese Ore (38%-40%)	88d./90d. per unit
Brass Wire	3s. 8¾d. per lb. basis
Brass Tubes, solid drawn	3s. 1¾d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

This article has not appeared since the printing dispute began and the price variations given below are for the whole period dating from January 27.

Trading in Kaffirs has remained on a relatively small scale and although an improvement in gold shares was to be expected following deflationary measures, South African politics have contributed a most effective wet blanket to what otherwise might have been an encouraging revival. South Africa has not increased her bank rate in sympathy with London and the announcement of restrictions on the transfers of capital to support this met with an unfavourable reception.

During the past week, individual mines were mostly easier led by Vogelstruisbult which have consistently fallen back. A better feature were mines in the Far West Rand group; Vaal Reefs and Hartebeestfontein both improved, the former on development hopes and the latter supported by buying in Johannesburg. Buffelsfontein were a particularly bright feature due to rapid shaft sinking and underground development.

In the Orange Free State section, trading conditions during the past week were quiet although there were individual features of interest. Free State Geduld led the market and held their gains. Merriespruit improved following news of the pouring of the first goldbars, but the price was restrained by the company's large loan issues and also Kennecott Copper Company has substantial conversion rights at 12s. 6d.

The main feature among West Africans was the end of the native labour strike which has lasted since November. All the leading companies went ahead sharply. Ashanti at one time fell to 18s. after the passing of the dividend. The dispute has cost the company a lot of money and it is hoped that development work will now be pushed ahead.

In the Australian section, prices were generally firmer but North Kalgurli fell back due to the necessity for raising fresh capital.

Diamonds remained in the doldrums but platinums were favoured, due partly to the higher metal price and partly to the medium term outlook for metal consumption. It is now used by both the chemical and oil industries.

Coppers have been an interesting market. Chartered remained firm despite being quoted ex dividend. The company has produced an excellent report and it is interesting to see that the average copper price for the year ending September, 1955, was approximately £295 per ton as against the current price of £400 a ton. The company's investments are valued at about 43s. 6d. a share leaving the 30-year Royalties, valued at about 28s. 6d., at current market levels.

Rhodesian Selection improved when the group raised its copper price to £385 a ton. The rise in Messina was restrained by news that the company has effected forward sales which were made at lower prices than to-day. Rhodesia Katanga have encountered water problems and underground development has been restricted in some places. Rio Tinto have made further progress with their world wide plans and arrangements are in hand to operate the important Mary Kathleen lease in Queensland. The Rhodesian copper industry is lending the Federal Government £20,000,000 to develop the Kariba Gorge hydro-electric scheme.

Lead/zinc shares were erratic on the lower metal prices but Mount Isa went ahead as a share split is imminent. The company also benefits from the high price of copper. San Francisco Mines turned sharply lower following the increased distribution, 40 per cent being paid for the year out of earnings of 41¼ per cent. The company may not be able to maintain this rate if the metal price continues to fall. Trepca improved to 5s. 6d. later falling back to 5s. 1½d.; this was due to estimates of the enhanced value of the shares on the new compensation award.

Canadian mines hardened following the base metal prices, and benefited with the whole American market from Mr. Eisenhower's decision to stand for another term as President of the United States.

Finance	Price Feb. 29	+ or — Jan. 27
African & European	2½	— ⅛
Anglo American Corpn.	8⅛	— ¼
Anglo-French	21/3	—6d
Anglo Transvaal Consol	28/9	.....
Central Mining (£1 shrs)	44/-	+ 3/6
Consolidated Goldfields	59/3	+ 2/3
Consol. Mines Selection	35/7½	.....
East Rand Consols	1/7½	—1½d
General Mining	4⅛	— ⅛
H.E. Prop.	8/3	+ 1/3
Johnnies	40/6	+ 1/6
Rand Mines	3⅜	— ⅛
Rand Selection	41/3	+ 3/1½
Union Corporation	41/-	+ 3d
Vereeniging Estates	4¼	— ¼
Writs	36/3	.....
West Wits	41/6	+ 2/-
Rand Gold		
Blyvoors	24/9	+ 1/9
Brakpan	7/-	+ 9d
Buffelsfontein	28/6	+ 3/3
City Deep	10/-	.....
Consol. Main Reef	20/-	+ 1/10½
Crown	2⅜	+ ⅛
Daggas	2⅜	+ ⅛
Dominion Reefs	22/3	+ 4½d
Doornfontein	23/9	+ 1/6
Durban Deep	32/6	+ 3/1½
E. Champs	4/3	.....
E. Daggas	9/9	+ 3d
E. Geduld (4s. units)	34/-	+ 4/3
E. Rand Props.	2⅛	+ ¼
Geduld	4⅛	+ ¼
Govt. Areas	5/3	.....
Grootvlei	22/-	+ 9d
Hartebeestfontein	36/9	+ 2/6
Libanon	7/6	+ 3d
Luipaards Vlei	17/3	— 3d
Marievale	22/-	+ 1/-
New Kleinfontein	5/6	+ 6d
New Pioneer	15/3	+ 1/3
Randfontein	48/9	+ 3/9
Robinson Deep	15/-	+ 1/-
Rose Deep	10/3	+ 6d
Simmer & Jack	4/3	+ 6d
S.A. Lands	21/10½	+ 1/10½
Springs	2/10½	.....
Stilfontein	26/3	+ 1/3
Sub Nigel	33/9	+ 1/10½
Vaal Reefs	32/-	+ 3/10½
Van Dyk	3/4½	—1½d
Venterspost	13/6	+ 6d
Vlakfontein	17/9	+ 1/9
Vogelstruisbult	24/3	— 3/6
West Driefontein	5¼	+ ¼

Rand Gold contd.	Price Feb. 29	+ or — Jan. 27
W. Rand Consolidated	40/-	— 4/4½
Western Reefs	35/-	+ 1/6
O.P.S. Gold		
Freddies	7/4½	+ 10½d
Freddies Consolidated	4/9	+ 6d
F.S. Geduld	4⅜	+ ⅛
Geoffries	13/9	+ 3d
Harmony	27/6	.....
Loraine	6/7½	+ 7½d
Lydenburg Estates	18/-	+ 1/9
Merriespruit	11/-	+ 9d
Middle Wits	13/6	+ 9d
Ofsits	61/-	+ 3/-
President Brand	63/11½	+ 3/11½
President Steyn	33/9	+ 6d
St. Helena	28/6	+ 2/3
Virginia Ord.	11/6	+ 1/-
Welkom	21/6	+ 3/4½
Western Holdings	3½	+ ⅛
West African Gold		
Amalgamated Banket	2/-	.....
Ariston	5/4½	+ 3d
Ashanti	20/6	+ 1/6
Bibiani	3/6	+ 1½d
Bremang	1/6	.....
G.C. Main Reef	2/3	.....
Konongo	2/-	.....
Marlu	3dXD	—3d
Taquah	1/7½	—1½d
Western Selection	8/1½	+ 1½d
Australian Gold		
Gold Mines of Kalgoorlie	12/6	+ 3d
Great Boulder Prop.	11/3	+ 6d
Lake View & Star	16/9	— 3d
Mount Morgan	24/9	+ 1/6
North Kalgurli	7/7½	— 1½
Sons of Gwalia	3/1½	+ 1½d
Western Mining	9/9	+ 9d
Miscellaneous Gold		
Cam & Motor	8/7½	+ 4½
Champion Reef	4/6	— 6d
Falcon Mines	7/1½	+ 9d
Globe & Phoenix	26/6	+ 1/3
Motapa	1/1½	+ 1½d
Mysore	2/6	.....
Nundydroog	6/6	—6d
St. John d'El Rey	19/3	+ 1/3
Zams	56/10½	+ 1/10½

Diamonds and Platinum	Price Feb. 29	+ or — Jan. 27
Anglo American Inv.	9⅛	+ ⅛
Casts	25/-	.....
Cons. Diam. of S.W.A.	8	+ ¼
De Beers Defd. Bearer	6⅛	+ ⅛
De Beers Pfd. Bearer	15⅛	.....
Pots Platinum	12/3	+ 1/-
Watervaal	19/9	+ 1/9
Copper		
Bancroft	38/3	+ 2/-
Chartered	73/3XD	+ 2/-
Esperanza	4/-	+ 1½d
Messina	9⅛	+ 1
Nchanga	14⅛	+ ⅛
Rhod-Anglo-American	5¼	+ ⅛
Rhod-Katanga	28/6	— 3/9
Rhodesian Selection	50/6	+ 4/-
Rhokana	41½	+ ¼
Rio Tinto	3⅞	+ ⅛
Roan Antelope	28/6	+ 2/1½
Selection Trust	4⅛	+ ⅛
Tanks	8¼	+ ¼
Tharsis Sulphur Br.	5	— ¼
Tin (Eastern)		
Ayer Hitam	21/6	—9d
Gopeng	9/9	—9d
Hongkong	7/7½	—1½d
Ipoh	23/6	.....
Kamunting	9/4½	—1/4½
Kepong Dredging	3/3	—3d
Kinta Tin Mines	17/3	—6d
Malayan Dredging	10/4½	—7½d
Pahang	12/1½	—4½d
Pengkalen	11/-	—1/-
Petaling	9/3	—6d
Rambutan	25/-	+ 9d
Siamese Tin	9/1½	+ 3d
Southern Kinta	16/4½	—10½d
S. Malayan	8/3	—10½d
S. Tronoh	7/7½	—7½d
Sungei Kinta	15/6	—1/6
Tekka Taiping	8/10½	—6d
Tronoh	8/9	—9d
Tin (Nigerian and Miscellaneous)		
Amalgamated Tin	11/7½	—1½d
Beralt Tin	39/6	+ 10½d
Bisichi	5/10½	—1½d
British Tin Inv.	22/9	— 2/3
Ex-Lands Nigeria	2/10½	.....
Geevor Tin	16/4½	—1/-

Tin (Nigerian and Miscellaneous) contd.	Price Feb. 29	+ or — Jan. 27
Gold & Base Metal	1/7½	.....
Jantar Nigeria	5/7½	.....
Jos Tin Area	12/3	—2/3
Kaduna Prospectors	1/9	—3d
Kaduna Syndicate	2/9	—3d
London Tin	9/4½	—4½d
United Tin	1/6	—3d
Silver, Lead, Zinc		
Broken Hill South	58/-	+ 1/9
Burma Corporation	2/10½	.....
Consol. Zinc	50/6	—1/6
Lake George	14/4½	+ 1/-
Mount Isa	70/7½	+ 8/10½
New Broken Hill	42/9	+ 3d
North Broken Hill	90/-	+ 3/3
Rhodesian Broken Hill	13/3	—4½d
San Francisco Mines	24/6	—4/3
Uruwira	6/1½	+ 1½d
Miscellaneous Base Metals and Coal		
Amal. Collieries of S.A.	46/6	—6d
Associated Manganese	40/-	+ 5/-
Cape Asbestos	9/4½	—4½d
C.P. Manganese	30/9	—1/9
Consol. Murchison	59/4½	+ 5/-
Natal Navigation	3⅜	+ ⅛
Turner & Newall	98/3	—6/3
Wankie	17/1½	—10½d
Witbank Colliery	5⅛	.....
Canadian Mines		
Dome	$28	+ 2½
Hollinger	$44XD	+ 1
Hudson Bay Mining	$123	+ 4½
International Nickel	$149	+ 4
Mining Corpn. of Canada	£8⅛	+ ⅛
Noranda	$101	+ 7
Quemont	£9¼	+ ¼
Yukon	4/4½	—3d
Oil		
Apex	30/6	+ 6d
Attock	41/3	—1/9
British Petroleum	5⅛	+ ¼
Burmah	3¼	.....
Canadian Eagle	52/6	—1/9
Mexican Eagle	22/-	+ 1/3
Shell	6¼	— ⅛
Trinidad Leasehold	33/-	—9d
T.P.D.	31/3	+ 4/-
Ultramar	35/-	+ 3d

COMPANY NEWS AND VIEWS

4 Per Cent Sulphide Ore Disclosed at Kansanshi

Amongst interesting information published by the consulting engineers of Kansanshi Copper Mining Company in respect of twelve months ended December 31, 1955, the fact that sulphide ore of workable grades and widths had been encountered above the 290 ft. level on the "H" Vein may be rated as most encouraging. The deposit extended for some 50 ft. and sampling—although not complete—indicated a small tonnage of sulphide ore with an average value of about 4 per cent copper.

Since re-opening the Kansanshi Mine in March, 1955, underground development has been restricted by the lack of power and pumping facilities. Despite this, a total of 1,794 ft. of development on ore and 809 ft. in waste have been accomplished. In addition, 104,000 cu. ft. of excavation in pump chambers, stations and drive enlargement has been achieved. As sufficient power became available at the property towards the end of 1955, an expansion of underground work should not be long delayed.

Apart from its published oxidized reserves amounting to nearly 4,000,000 tons of surface ore at a grade of about 3.65 per cent for which—so far as is generally known an economic method of treatment has not yet been found—the prospects for Kansanshi becoming a successful copper producer depend largely upon proving substantial workable sulphide reserves at depth. For this reason, when last writing about the company in our January 13 issue, page 59, we expressed the belief that at 35s. the shares of Rhodesia-Katanga (which owns about 35 per cent of Kansanshi) did not discount sufficiently possible future disappointments. Since that time the price has fallen to about 30s. and although development on the 400 and 500 ft. levels will be necessary before the establishment of any useful sulphide ore reserve can be expected, the actual disclosure of workable sulphide deposits has considerably enhanced the company's outlook.

While development work in the coming months must decide the all-important question of whether sufficient sulphides exist for the company to realize its full potential, the latest report certainly makes "Rho-Kats" £1 shares look attractive at their present price. The venture is, of course, speculative, but the chances of success appear most hopeful.

Sharp Fall in Rand Selection's Sharedealing Profits

Perhaps the most interesting aspect of Rand Selection Corporation's report and accounts for the year ended September 30, 1955, was the sharp drop in sharedealing profits. But against this, income from investments increased to £1,045,012 from £682,190 while receipts from rent, royalties, etc., of £252,962 compared with only £195,131. These additions considerably softened a blow which would otherwise have severely affected total revenue.

Year to Sept. 30	*Total* Revenue*	*Taxation*	*Dividends*	*Net Profit*	*To Reserve*	*Carry Forward*
	£	£	£	£	£	£
1955	1,453,461	86,613	818,547	1,155,768	329,095	497,139
1954	1,696,374	288,118	818,547	1,144,477	100,000	546,208

* Including profits from sharedealing, less amounts written off, £155,487 (1954—£819,053).

A dividend of 45 per cent was maintained for the second successive year on the issued ordinary capital of £1,818,993 in shares of 5s.

Although falls in share prices during the past financial year lowered the market value of quoted securities to £19,930,215 from £20,809,840, the margin of £12,516,881 over cost figures (less amounts written off) is still exceptionally large. Besides this, current assets as at September 30, 1955, exceeded current liabilities by about £180,000.

At their present price of around 41s. 6d. Rand Selection 5s. shares by giving the low return of about 5½ per cent reflect this large Anglo American group investment company's substantial growth prospects. This applies particularly to its important holdings of O.F.S. shares. Mr. A. Wilson is chairman. Meeting, Johannesburg, March 14.

Chartered's Expansion

Total assets of The British South Africa Company shown on the consolidated balance sheet at September 30, 1955, expanded to £35,526,353 from £31,395,787 in the previous year. Quoted investments having a balance sheet value of £15,451,030 were accorded a market value of £33,220,173. Current assets, including £3,085,243 in cash and £2,000,000 of tax reserve certificates, exceeded current liabilities by about £3,300,000. Consolidated profits after taxation and minority interests earned during the past financial year rose to £5,647,267 from £3,316,920. Mr. C. Hely-Hutchinson is president. Meeting, London, March 22.

Ashanti and Bibiani Pass Final Dividends

Despite increased profits during their financial years ended September 30, 1955, which would normally have justified the maintenance of total distributions, both Ashanti Goldfields Corporation and Bibiani (1927) have passed final dividends. This has been necessary in order to conserve financial resources reduced since the year-end by the strike of African employees.

Subject to final audit, profit, after all charges including taxation, made by Ashanti Goldfields moved up to £447,207 from £323,967. Dividends absorbed £143,584 (£247,682) and the balance carried forward advanced to £446,365 from £192,742.

Profits from Bibiani (1927)—also subject to final audit—increased to £87,267 from £67,018. Dividends absorbed £14,375 (£27,560). A balance of £266,114 carried forward compared with £218,222 previously.

Gold Coast Strike Ended

With the return to work during the past day or so of African labour to Gold Coast Mines, the strike which began on November 20 last year is reported to be at an end. What prompted this sudden collapse is not yet clear, but shortage of ready cash may have played a considerable part. Yet it would be unwise at this stage to assume that the matter will be satisfactorily settled. There is little doubt that African labour—by virtue of an abundance of other jobs available on the Gold Coast—is still in an extremely strong bargaining position. It is doubtful, therefore—despite the return to work—that a purely nominal wage concession will be sufficient to prevent further stoppages. Findings by the Board of Enquiry set up to examine the issue—due to be published shortly—must, therefore, be awaited with some anxiety.

Trepca's Compensation Will Total £1,054,000

The Foreign Compensation Commission has finally determined that Trepca Mines has an established claim against the Yugoslavian Compensation Fund amounting to £5,883,079. As the Commission has decided on a distribution of no more than 2s. 9d. in the £, the amount due to Trepca will total about £1,054,000. Of this figure, £808,923 has already been received leaving £245,000 still due to the company for its former Yugoslavian assets.

Company Shorts

'Frisco Has 6½ Years Ore Reserves.—At the meeting of San Francisco Mines of Mexico the chairman, Mr. C. E. Temperley, said that if lead-zinc prices did not fall and no other untoward events occurred, results for 1955-56 should be satisfactory—or at least as satisfactory as the tremendous burden of taxation permitted. Output last year reached the record figure of 760,000 tons. Morever, despite wage increases and continued rises in the cost of supplies, an overall reduction in operating expenses per ton milled had been achieved. Ore reserves at Mexican properties represented about 6½ years ahead of the mill at present crushing rates.

South African Townships Mining and Finance Corporation.—Quoted investments shown at a balance sheet figure of £1,360,647 had a market value as at September 30, 1955, of £5,341,028. Total assets of £3,065,178 compared with £3,148,992 including fixed assets of £85,117 (£88,129) while townships, land and agricultural holdings totalled £472,189 (£648,861). Purchases and loans were shown at £545,822 (£296,224) and current assets exceeded current liabilities by £120,438. South African Townships is a subsidiary of Rand Selection Corporation which owns some 90 per cent of its £2,400,000 issued ordinary capital. Mr. A. Wilson is chairman. Meeting, Johannesburg, March 14.

Production Started at Merriespruit.—At the ceremonial opening of Merriespruit (Orange Free State) Gold Mine a few days ago, Mr. S. G. Menell stated that a maiden production declara-

tion should be made in respect of March. It was hoped that a record initial crushing rate for the O.F.S. of over 70,000 tons would be achieved.

Kampong Kamunting Tin Dredging.—As at June 30, 1955 investments shown at a balance sheet figure of £7,830 had an approximate market value of £7,632. Current assets of £34,37 compared with current liabilities and provisions of £960. Fixed assets declined to £10,083 from £11,691. After tax net profit of £129 compared with the preceding year's net loss of £7,762. A Malayan income tax refund of £7,003 raised the balance carried forward to £12,239 from £6,301.

North Kalgurli to Issue 1,100,000 Shares at 4s.—North Kalgurli (1912) proposes to issue 1,100,000 shares of 2s. each at 4s. in the proportion of 1 for every 2 held. It is hoped to issue provisional allotment letters together with a circular from the company on March 2.

Morning Star Calls Final 1s. 6d.—A second and final call of 1s. 6d. (Australian currency) on its recent issue of 500,000 shares of 4s. each at par has been announced by Morning Star (G.M.A.). Notice of the call—which is payable on March 14, 1956—was to be sent to all shareholders concerned on February 28.

Nigeria Electricity Passes Capital Increase Proposals.—At an extraordinary meeting held on February 22 a proposal for increasing the authorized capital of Nigerian Electricity Supply Corporation from £600,000 to £800,000 by the creation of 200,000 ordinary shares of £1 each was passed. Approval was also given to the proposal for capitalizing £148,636 by the issue of one fully paid ordinary share of £1 each for every four shares held.

Increase in Wankie Coal Price.—The Southern Rhodesian Government has announced that the price of Wankie coal will be increased by 6d. a ton from March 1. This revision will apply to consumers throughout the Central African Federation.

Austral Amalgamated Tin.—Current assets exceeded current liabilities as at June 30, 1955, by £134,461. Fixed assets rose to £1,078,301 from £889,658 while investments, having a balance sheet valuation of £8,000, had a market worth of £7,862. Net profits earned rose to £229,920 from £115,244. The balance carried forward advanced sharply to £238,455 from £148,385.

Austral Malay Tin.—Current liabilities and provisions of £22,380 compared with current assets of £68,966 as at June 30, 1955. Fixed assets rose to £71,831 from £47,222 while investments in associated companies at par—less amounts written off—shown on the balance sheet at £45,963 had an approximate market value of £252,805. Net profits after tax dropped to £1,457 from £10,647.

RECENT INTERIM DIVIDEND ANNOUNCEMENTS

Company	Year ending	Dividends	Date payable	This year to date	Total last year
		%		%	%
Amal. Tin ..	.. 31. 3.56	12*a*	April 4	20	45
Electro Zinc	.. 3. 6.56	15	May 4	15	55
Kaduna P. ..	.. 31.12.55	Nil	—	Nil	25
Kaduna S. ..	.. 31.12.55	16¾	Feb. 21	16¾	66¾
Waterval Plat.	.. 31. 8.56	28.33	Mar. 13	28.33	103.34*b*
Potgietersrust Plat...	31. 8.56	55.55	Mar. 13	55.55	133.33
S. Kinta *c* ..	.. 31. 3.56	20	Mar. 26	32½	82½
Gt. Boulder..	.. 31.12.55	30	May 4	50	50
Mt. Morgan	.. 30. 6.56	10	Mar. 31	10	25

a 2nd interim (1953/54—two interims of 8 at 12 per cent respectively, and final of 25 per cent.
b One interim of 44 4/9 per cent and final of 88 8/9 per cent.
c 1st and 2nd interim dividends on capital of £769,000 (previous capital £962,000).

DUTCH MINING ENGINEER—GEOLOGIST, M.A., Dr. Technical Sciences, seeks employment as Manager, Resident Chief Geologist or Chief of Exploration Programme. 35 years' experience in coal, oil and metal mining. Go anywhere; preferably Africa or Canada. Fluent English, French, German, Dutch, Spanish, Portuguese, Swahili, working knowledge of Malay. Age 58. Excellent health. At present employed in Central Africa. Available on three months' notice. Write Box 576, The Mining Journal, 15 Wilson Street, Moorgate, London, E.C.2.

Gold Mine Returns

INDIAN GOLD

Company	January 1956 Tons (000)	January 1956 Yield (oz.)	Months since year-end	Current Financial Year Total to date Tons (000)	Current Financial Year Total to date Yield (oz.)	Last Financial Year Total to date Tons (000)	Last Financial Year Total to date Yield (oz.)
Champion Reef	15·7	5,335	1	15·7	5,335	12·8	5,229
Mysore	18·2	5,383	1	18·2	5,383	16·8	4,588
Nundydroog*	18·9	4,499*	1	18·9	4,499	19·4	4,535

* Includes tailings.

MISCELLANEOUS GOLD

Company	January 1956 Tons (000)	January 1956 Yield (oz.)	Months since year-end	Current Financial Year Total to date Tons (000)	Current Financial Year Total to date Yield (oz.)	Last Financial Year Total to date Tons (000)	Last Financial Year Total to date Yield (oz.)
Br. Gu. Consol*	159·2	1,240	1	159·2	1,240	153·2	1,961
Clutha River*	*a*277·0	507	11	2,657·0	4,882	2412·0	4,738
Frontino	11·1	10,730*c*	1	11·1	10,730	12·3	6,039
Kentan (Geita)	21·3	3,363	7	156·5	23,610	156·1	23,986
New Gu. G'fields	3·4	1,665*b*	3	10·3	5,409	10·5	4,770
St. John d'El Rey	26·7	115	1	26·7	115	25·4	110

* Cu. yd. dredged.
a From Jan. 6 to Feb. 3.
b One month late, including 452 oz. from tributors and Koranga Alluvials.
c This figure includes 4,490 oz. from special clean-up of the mill.

AUSTRALIAN GOLD

Company	4 weeks to January 24 1956 Tons (000)	4 weeks to January 24 1956 Yield (oz.)	4 weekly period since year-end	Current Financial Year Total to date Tons (000)	Current Financial Year Total to date Yield (oz.)	Last Financial Year Total to date Tons (000)	Last Financial Year Total to date Yield (oz.)
Central Norseman	12·2	5,225	11	145·9	81,314	133·2	69,682
Central Victoria*	102·0	516*b*	11	954·6	3,888	1570·8	4,823
G.M's. of Kalgoorlie	39·6	10,716*d*	11	417·1	107,401	169·7	46,984
Morning Star	·7	269*a*	11	13·9	4,287	14·1	9,367
North Kalgurli	27·7	5,861	1	27·7	5,861	19·2	4,279
Sons of Gwalia	1·9	518*c*	13	112·8	23,200	115·5	26,163

* Cu. yd. dredged.
a Only 8 days' production during first fortnight.
b Dredge closed one day, statutory holiday.
c Main shaft collapsed Dec. 6. Only mining on 4ft of Rising from No. 1 level, ore production expected on Jan. 30.
d Including 841 oz. in concentrates.

SOUTHERN RHODESIAN GOLD

Company	January, 1956 Tons (000)	January, 1956 Yield (oz.)	January, 1956 Profit (£000)	Months since year end	Current Financial Year Total to date Tons (000)	Current Financial Year Total to date Yield (oz.)	Current Financial Year Total to date Profit (£000)	Last Financial Year Total to date Tons (000)	Last Financial Year Total to date Yield (oz.)	Last Financial Year Total to date Profit (£000)
Arcturus	3·1	1,315	5·3	7	21·4	7,866	34·2	21·4	6,474	22·4
Cam & Motor	24·5	7,938	40·9	7	164·0	53,536	274·5	169·0	52,903	289·3
Falcon Mines	19·1	3,379	*a*9·7	4	74·3	13,201	38·1	68·9	12,539	48·4
Globe & Phoenix	6·2	3,669	23·2	1	6·2	3,669	23·2	6·2	3,548	24·1
Motapa Gold*	16·8	2,490	2·9	1	16·8	2,490	2·9	15·4	2,109	L ·3
Muriel Mine	3·5	1,075	10·0	7	23·3	7,407	71·2	21·8	6,903	70·4
Tebekwe	3·3	734	2·3	7	39·7	6,707	23·0	57·4	—	18·4

* Excluding premium gold sales.
L indicates a loss.
a This figure includes additional profit from accumulated concentrates retreated from all 3 mines.

ASSISTANT TO WORKS MANAGER. London Area. Well educated and knowledge of crushing, grinding and screening plant desirable. Full particulars to Box No. 577, *The Mining Journal*, 15 Wilson Street, Moorgate, London, E.C.2.

AGENCE MINIÈRE ET MARITIME S A
2, RUE VAN BREE — ANTWERP — BELGIUM
Sworn weighers, samplers of ores, metals and residues. Agents for shippers at European ports and plants.
Market surveyors and advisers assuring sales direct to consumers
Telegrams : Rentiers-Antwerp

RAMBUTAN, LTD.

MR. DONALD W. THOMAS'S STATEMENT

The fiftieth annual general meeting of Rambutan, Ltd., was held on February 20th at the Registered Office, Redruth.

Mr. Donald W. Thomas (Chairman) presided.

The Reports and Accounts for the year ended 30th June, 1955, having been circulated for the prescribed time, were taken as read, as was also the Chairman's Statement, circulated with the Accounts which was as follows:—

The accounts for the financial year ended June 30, 1955, show a profit of £24,022, after payment of royalty of £18,234 to the Malayan Government in respect of tin ore sold during the year and the provision of £31,065 for United Kingdom and Malayan taxation. The increased profit is attributable to the continued good returns from Paddock Z, to the larger volume of ground treated which was 840,700 cubic yards against 469,500 cubic yards during 1953/54, and to a slightly better price per ton received for the tin-ore produced. Four dividends totalling 7s per share were paid in respect of profits for the year and absorbed a net amount of £19,750.

The sum of £1,079 has been written off from Capital Expenditure and £3,291 transferred to the General Reserve Account. After making necessary provisions in respect of previous years, the balance standing to the credit of Profit and Loss Account has been increased from £14,103 to £15,098, which the Directors propose to carry forward. The return for the first six months of the current year is 118¼ tons as compared with 122¼ tons for the corresponding period of the previous year.

The attention of members is drawn to the Report of our General Managers, Messrs. Osborne and Chappel, circulated with the Reports and Accounts, which gives particulars of the work done at the mine during the year under review.

Shareholders will note that it is stated that prospects for the current year are favourable and that the present improved rate of output should be maintained. If the International Tin Agreement comes into force the Company's output may be adversely affected. The draft Agreement still awaits ratification by the Indonesian Government.

Since the General Managers' Report was written a new wage structure has been agreed between the Malayan Mining Employers' Association and the Malayan Mining Employees' Union and the consequent increases are bound to have effect upon the costs of production.

Security conditions on the property remain satisfactory and no incidents occurred.

In conclusion I would like to express to our General Managers, Resident Manager and Staff in Malaya, and to our Secretary and Staff at Redruth, the Board's sincere appreciation of all they have done for the Company during the year under review.

The Statement of Accounts and Balance Sheet, together with the Directors' Report, were received and adopted.

FALCON MINES, LTD.

MR. E. B. PAPENFUS'S STATEMENT

The forty-sixth annual general meeting of Falcon Mines, Ltd., will be held March 27, 1956, in Bulawayo, Southern Rhodesia.

The following is the Statement of the Chairman, **Mr. E. B. Papenfus,** which was circulated with the Report and Accounts for the year ended September 30, 1955:—

No changes have taken place in the Authorised and Issued Capital of your Company. The mining claims and properties held also remain unchanged and are as listed in the Directors' Report.

Capital Expenditure, less recoupments, during the year totalled £28,431. Of this, £25,435 was incurred at the Dalny Mine, the principal item being £16,049 in respect of shaft sinking, which I will refer to later.

The Net Profit for the year was £142,761, which included an estimated £35,854 derived from the re-treatment of concentrates produced and stockpiled prior to September 30, 1954. The whole of the stockpile of unroasted concentrates on hand at the Dalny Mine has now been re-treated

With regard to the Appropriation Account, an amount of £10,000 has been written off Unquoted Investments and £49,218 has been transferred to Profits Appropriated for Expenditure on Fixed Assets, Mine Stores, etc.

After providing for Dividends Nos. 3 and 4, totalling 17½ per cent (10½d. per share) declared during the year, there remained a credit balance on Appropriation Account of £23,518, compared with £19,408 brought forward from last year.

The item previously appearing in the Balance Sheet as "General Reserve" is now shown as "Profits Appropriated for Expenditure on Fixed Assets, Mine Stores, etc.", and after taking into account the transfer of £49,218 mentioned above, this account now stands at £474,218. When this is added to the Company's Issued Capital and Share Premium Account there is a total of £1,187,151 which is represented on the opposite side of the Balance Sheet by Fixed Assets, Mine Stores, Materials and Livestock

The account previously called "Provision for Replacement and Renewals" now appears as "Abnormal Costs Reserve".

DALNY MINE

As forecast in my Review for 1954, the ore reserves at the Dalny Mine decreased during the year and the estimated tonnage in reserve at 30th September, 1955, was 457,000 tons valued at 4.3 dwt. per ton over a width of 103 inches. This was 91,500 tons less than the last year's figure, the value being slightly higher and the width showing a small decrease. Development results since the end of the year have been very encouraging and a substantial stretch of new ore has been exposed to the west of the previously known Dalny ore bodies which is considerably higher in grade than the average of the mine. In addition, the deepening of the Rix Shaft to below the 13th level, which is now completed, will provide further development ends below the 9th level and enable new ore to be opened up at an accelerated rate. I anticipate that during the current financial year the tonnage of ore in reserve will show a substantial increase.

SUNACE AND BAY HORSE MINES

At the Sunace Mine the favourable development results obtained in 1954 were not maintained and the estimated ore reserve at September 30, 1955, declined to 13,400 tons, valued at 5.5 dwts. per ton over a width of 38 inches. The profits from this small mine have dropped still further during the current year, but several geological possibilities of obtaining payable ore in various parts of the mine have still to be tested. It is not possible to assess the future prospects at the present time.

The Bay Horse Mine also showed a decline in its ore reserve during the year and recent development results have not been encouraging. However, modest profits can reasonably be expected for the next year or so and possibilities of obtaining further payable ore still exist.

You will appreciate that the earnings of the Sunace and Bay Horse Mines have been relatively small during the past two years and that the Dalny Mine has accounted for the greater part of our profit. The outlook at the Dalny is eminently satisfactory and there are prospects of increasing the scale of our operations at this property if the good development results continue. There is no foreseeable reason why this should not be so.

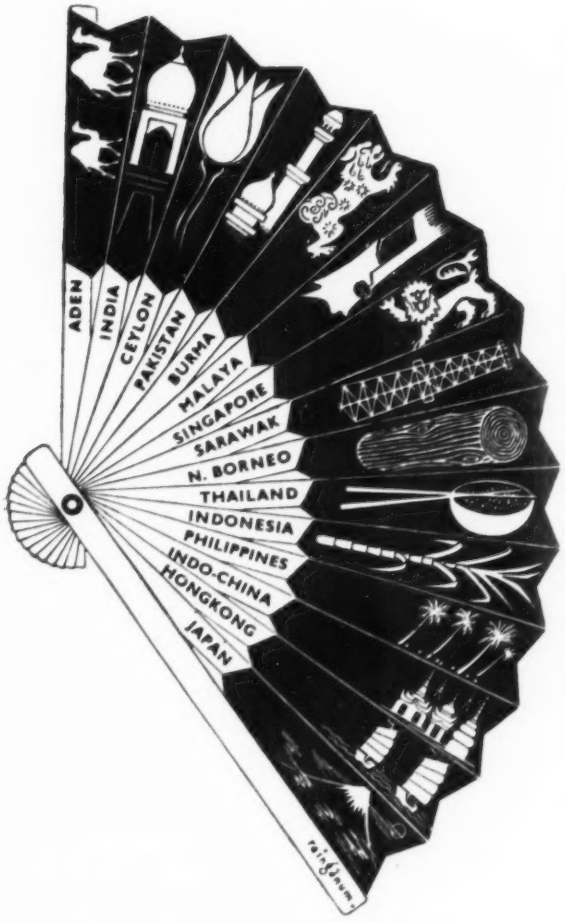
The Falcon Mine tribute was terminated on July 31, 1955, and your Company received a net income up to that date of £992. Towards the end of the year the M'tuga Copper Claims were tributed to a third party on a royalty basis, but no income was received up to September 30, 1955.

GOLD PRICE

The average price realized in respect of gold produced at the three mines operated by your Company was 249/3.5d. per ounce fine (1954—249/10.2d.), but monthly declarations of working profits continue to be based on the initial price paid to Southern Rhodesian gold producers which remained unchanged at 245/6d. per ounce fine.

As regards taxation, the Federal rate of 6/3 in the £ and the Southern Rhodesian Territorial Surcharge of 1/3d. remained unchanged but, as stated in the Director's Report, no taxation is at present payable by your Company because of the capital redemption allowance which it receives in respect of the Dalny Mine.

In conclusion I wish to place on record our appreciation of the services rendered by Mr. D. O. Pearce, who resigned as Manager of the Dalny Mine in April, 1955, and also to Mr. W. D. Hove, who succeeded him. Our thanks are also due to the Managers and Staffs of all the Company's mining properties for their loyal and efficient services during the year.



Spanning the East

Branches of The Chartered Bank of India, Australia and China under British management directed from London are established in most centres of commercial importance throughout Southern and South Eastern Asia and the Far East. At all these branches a complete banking service is available and, in particular, facilities are provided for the financing of international trade in co-operation with the Bank's offices in London, Manchester and Liverpool, its agencies in New York and Hamburg and a world-wide range of banking correspondents.

In London and Singapore the Bank is prepared to act as executor or trustee.

THE CHARTERED BANK OF INDIA, AUSTRALIA AND CHINA

(Incorporated by Royal Charter, 1853)

Head Office : 38 Bishopsgate, London, E.C.2

EASY ACCESS

is a big feature of the "new look" TINY TIM

This hardy little diesel, ideal for arduous conditions and inaccessible areas, has been designed to give easy access for maintenance work. It is a 15 h.p., 0-4-0 type loco of 2¼ tons weight and will start and haul up to 57 tons on level.

Hunslet

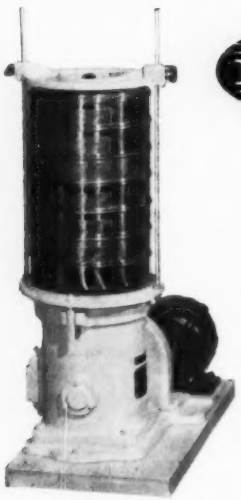
STEAM & DIESEL LOCOMOTIVES

THE HUNSLET ENGINE CO. LTD.

LEEDS 10

HD.57

INCLYNO
test sieve shaker



PASCALL ENGINEERING CO LTD

For accurate particle size analysis, vibration alone or hand shaking is insufficient. Vibration alone is more inclined to aggregate the material and not to separate it. The INCLYNO ensures perfect segregation of particle sizes in the shortest possible time with the double movement of gyrating and jolting the test material.

Essential for all laboratories the INCLYNO is standard equipment in many Government Laboratories, in those of the Nationalised Industries and of industry in general.

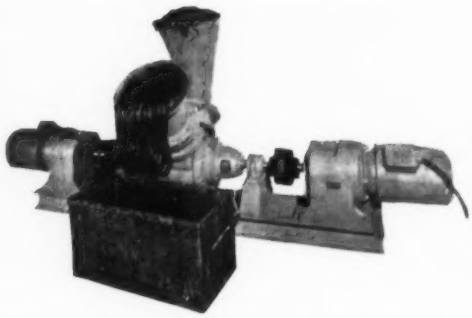
Operated by a fractional h.p. motor and supplied complete with automatic time switch. Models for 4 in. to 18 in. diam. test sieves.

The PASCALL INCLYNO is unequalled for accurate screen analysis.

PASCALL ENGINEERING CO. LTD.,
114 LISSON GROVE, LONDON, N.W.1

For full details, write or telephone Paddington 7236 for List IN1102.

COMET
POWERFUL, POSITIVE-ACTION, SLOW-REVVING PUMPS



A 4" heavy duty pump, driven simultaneously at each end by two 3 h.p. synchronised motors used for such applications as pumping liquorice, tar, soap, etc.

THE COMET PUMP & ENGINEERING COMPANY, LIMITED
JOHNSON ROAD, WEST CROYDON
Telegrams: **Comet, Croydon.** *Telephone:* **Thornton Heath 3816**

WOLVERHAMPTON DIAMOND DIE & TOOL Co. Ltd.

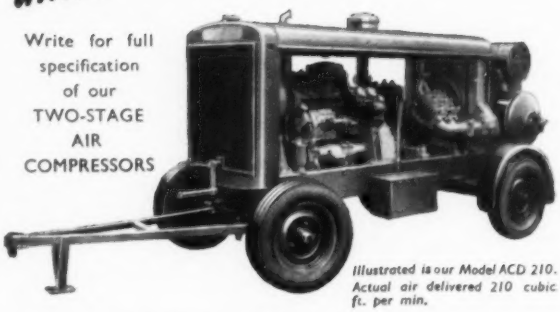
BOARTS
and
INDUSTRIAL DIAMONDS
Exporters

11 HATTON GARDEN, LONDON, E.C.1

Telephone : **HOLborn 3017** *Cables :* **Pardimon, London**

Designed and Built
For HARD WORK under HARD CONDITIONS

Write for full specification of our TWO-STAGE AIR COMPRESSORS



Illustrated is our Model ACD 210. Actual air delivered 210 cubic ft. per min.

PNEUMATIC TOOLS FOR ALL OPERATIONS

THE LEAD WOOL CO. LTD.
SNODLAND, KENT
'Phones: Snodland 84216/7.
'Grams: "Strength Phone Snodland"

Metal and Mineral Trades

A. STRAUSS & CO. LTD.

FOUNDED 1875

PLANTATION HOUSE, MINCING LANE, LONDON, E.C.3

METALS
Telephone: Mincing Lane 5551 (10 lines)
Telegrams: Straussar Phone London

Telex GB LN 8058

RUBBER
Telephone: Mansion House 9082 (3 lines)
Telegrams: Ascorub Phone London

MERCHANTS EXPORTERS IMPORTERS

Non-Ferrous Metals — Virgin, Alloys, Scrap
RUBBER COPPER REFINERS
Sole Agents for MUREX Fire Refined Copper

Members of the London Metal Exchange
Dealer Members of the Rubber Trade Association
Members of the National Association of Non-Ferrous Scrap Metal Merchants

CONSOLIDATED TIN SMELTERS, LIMITED.

ST. SWITHIN'S HOUSE, 11/12 ST. SWITHIN'S LANE, LONDON, E.C.4

Telephone MANsion House 2164/8 *Telegrams CONSMELTER, PHONE, LONDON*

PROPRIETORS OF THE FOLLOWING BRANDS OF LAMB & FLAG AND STRAITS TIN

ENGLISH INGOTS & BARS — MELLANEAR (99·9% Guaranteed), CORNISH MELLANEAR, PENPOLL (Common and Refined)

STRAITS INGOTS—E. S. Coy., Ltd., Penang BARS—Penang Palm

BUYERS OF ALL CLASSES OF TIN ORES

Sole Selling Agents: VIVIAN, YOUNGER & BOND, LIMITED
PRINCES HOUSE, 95 GRESHAM STREET, LONDON, E.C.2
Telephone: MONARCH 7221/7
Telex: LONDON 8665
Telegrams: BOND, STOCK, LONDON
Cables: BOND, LONDON

Telegrams: "BASSETT, PHONE, LONDON." Telephone: MANSION HOUSE 4401/3.

BASSETT SMITH & Co. Ltd.

(Incorporating George Smith & Son)

15/18 LIME ST., LONDON, E.C.3

METALS,
ORES (Copper, Zinc, Lead, &c., Complex),
RESIDUES, SKIMMINGS & ASHES
NON-FERROUS SCRAP

ESTABLISHED 1869

BLACKWELL'S METALLURGICAL WORKS LTD.

THERMETAL HOUSE, GARSTON, LIVERPOOL, 19

MAKERS OF
FERRO ALLOYS, NON-FERROUS ALLOYS
RARE METALS

BUYERS AND CONSUMERS OF
COLUMBITE, TANTALITE, TUNGSTEN
MANGANESE and all ORES

Works, Garston. Telegrams: Blackwell, Liverpool

Cable Address: WAHCHANG, NEW YORK

WAH CHANG CORPORATION

(FORMERLY WAH CHANG TRADING CORPORATION)

233 BROADWAY - - NEW YORK 7, NEW YORK

TUNGSTEN TIN

BUYERS
Tungsten Concentrates, Tungsten Tin Concentrates
Mixed Tungsten Ores
Tungsten Tailings, Scrap, Tips, Grindings
Tin Concentrates—Tin Dross, Tin Furnace Bottoms

SELLERS
Tungsten Concentrates to Buyers' Specifications
Tungsten Salts, Tungsten Powder
Tungsten Rods and Wires
Tungsten Ingots, Tin Oxides, Tin Chlorides

PLANT — GLEN COVE, NEW YORK

THE STRAITS TRADING
COMPANY, LIMITED

Head Office :
P.O. Box 700, OCEAN BUILDING, SINGAPORE

Works:
SINGAPORE & PENANG

"The Straits Trading Co. Ltd."
Brand of Straits Tin

THE BRITISH TIN SMELTING
COMPANY LIMITED

Works : LITHERLAND, LIVERPOOL

Smelters of Non-ferrous Residues and Scrap

London Agents :

W. E. MOULSDALE & CO., LTD.
2 Chantrey House, Eccleston Street, London, S.W.1
Cables : Wemoulanco London *Telephone :* SLOane 7288/9

FRANK & SCHULTE
Handelsgesellschaft m.b.H.
(Incorporating Frank & Dieckmann G.m.b.H.)
ALFREDSTRASSE 152 POSTBOX 515
ESSEN, GERMANY
Telegrams: Silizium Teleprinter No. 0857835 Telephone: 75921

ORES MINERALS FERRO-ALLOYS
METAL-ALLOYS METALS
CHEMICALS REFRACTORIES

Established 1922

OFFERS AND AGENCIES SOLICITED

Telephone : AMHERST 2211 (six lines)

E. AUSTIN & SONS
(London) LIMITED

ATLAS WHARF
HackneyWick,London,E.9

Are Buyers of all scrap
NON-FERROUS METALS, GUNMETAL, ALUMINIUM, COPPER, BRASS, LEAD, Etc.

Manufacturers of
INGOT BRASS, GUNMETAL & COPPER ALLOYS, INGOT LEAD, TYPE METAL, ZINC, Etc.

WORLD-WIDE SERVICE

DANIEL C.
GRIFFITH
& CO.
# ASSAYERS
TO THE BANK OF ENGLAND

27/33, PAUL STREET, LONDON, E.C.2.

Branch Office: **LEFKA, Cyprus**

Also at:
BRISTOL
BIRMINGHAM
GLASGOW
HULL
LIVERPOOL
NEWCASTLE
S. WALES

Analytical Chemists, Samplers, Technical representatives in sales of Ores & Metals at all Ports and Works.

Analyses of
PRECIOUS METALS
BASE METALS
ORES & RESIDUES
Etc.

Also in:
BELGIUM
CANADA
FRANCE
GERMANY
HOLLAND
ITALY
PORTUGAL
SPAIN
SWEDEN
SWITZERLAND
U.S.A.

Telephone: **MONARCH 1314 (3 lines)**
Telegraphic Address: **"GRYFFYDD, LONDON."**

Telephone: MON. 5941-3 *Cables:* AYRTONMET *Telex:* LONDON 2 2475

AYRTON METALS LIMITED
(Members of the London Metal Exchange)
IMPERIAL HOUSE, DOMINION STREET, LONDON, E.C.2

IMPORTERS AND EXPORTERS OF
NON-FERROUS VIRGIN METALS, SCRAP, ALLOYS, ORES, MINERALS AND BY-PRODUCTS
containing
BASE AND PRECIOUS METALS
DEALERS IN PLATINUM GROUP METALS
ADVANCES MADE AGAINST CONSIGNMENTS

U.S. Agents
The Ayrton Metal & Ore Cpn., 30 Rockefeller Plaza, New York 20, N.Y

Telegrams :	*Cables :*	*Telephone:*	*International Telex :*
Nonfermet Telex, London	Nonfermet London	Mansion House 4521	London 8547

HENRY GARDNER & CO. LTD.

Non-Ferrous Metals and Semi-Manufactures, Ores, Minerals and Residues, Rubber Iron and Steel and General Merchandise

---

2 METAL EXCHANGE BUILDINGS, LONDON, E.C.3
and at BIRMINGHAM, MANCHESTER, and GLASGOW

LEAD ZINC

THE ANGLO CHEMICAL & ORE CO. LTD.

(Members of the London Metal Exchange)

PALMERSTON HOUSE, BISHOPSGATE, LONDON, E.C.2.

Cables: "CHEMORE" Telephone: LONDON WALL 7255 (8 lines) Telex: LONDON 8043

COPPER TIN

GEORGE T. HOLLOWAY & CO. LTD.

METALLURGISTS & ASSAYERS, ORE TESTING, WORKS AND METALLURGICAL RESEARCH LABORATORIES

Atlas Road, Victoria Road, Acton, LONDON, N.W.10

Telephone No.: ELGAR 5202 Tels. & Cables: NEOLITHIC LONDON

EVERITT & Co. LTD. 40 CHAPEL STREET LIVERPOOL

Teleg. Address: Persistent, Liverpool Phone: 2995 Central

SPECIALITY:

MANGANESE PEROXIDE ORES

We are buyers of:

WOLFRAM, SCHEELITE, VANADIUM, MOLYBDENITE, ILMENITE, RUTILE, ZIRCONIUM and TANTALITE ORES

Suppliers of:

FERRO-ALLOYS & METALS, NON-FERROUS ALLOYS

P. & W. MACLELLAN LTD.

129 TRONGATE, GLASGOW

NON-FERROUS METALS all classes

INGOT SCRAP MANUFACTURED

Letters: P.O. Box 95 Glasgow

Telegrams: Maclellan, Glasgow Telephone: Bell 3403 (20 lines)

RHONDDA METAL CO. LTD.

1 HAY HILL, BERKELEY SQ., LONDON, W.1.

Works PORTH, GLAM.

PHOSPHOR COPPER, PHOSPHOR BRONZE, LEAD BRONZE, GUNMETAL, BRASS

Telephone: MAYFAIR 4654 Cables: RONDAMET

EXPORT **K. WASSERMANN LTD.** IMPORT

127, KINGS CROSS ROAD, LONDON, W.C.1

FERRO-ALLOYS

NON-FERROUS METALS : CHEMICALS

Cables: Metafe, London Telephone: TERminus 8282-3-4

BARNET NON-FERROUS METAL CO.

Elektron House, Brookhill Road, New Barnet, Herts.

Phone: Barnet 5187 and 3901

STOCKISTS OF: Aluminium, Brass and Copper

BUYERS OF: all non-ferrous scrap

The RIGHT firm to deal with

J. LOWENSTEIN & CO. LTD.

GREENWICH HOUSE, 10/13 NEWGATE STREET, LONDON, E.C.1

Telephone: City 8401 (7 lines)

ORES - METALS - RESIDUES

ROURA & FORGAS, LTD. Telephone No: GERRARD 9641

Sole Sterling Area Suppliers of

ITALIAN QUICKSILVER

PRODUCED BY MONTE AMIATA, S.M.P.A.

COLQUHOUN HOUSE, 27/37 BROADWICK STREET, LONDON, W.1

MINING & CHEMICAL PRODUCTS LIMITED

86 Strand London WC2

Telephone Temple Bar 6511/3

Buyers of Ores, Concentrates and Residues of

BISMUTH

SILVER

SELENIUM

METAL SUPPLIES Ltd

Suppliers of

COPPER REFRIGERATOR TUBING

and all other

NON FERROUS TUBING

72 VICTORIA ST. LONDON S.W.1

Phone: VICTORIA 1735 (3 lines). 'Grams: METASUPS, WESPHONE.

WANTED TO BUY

Complex Ores & Concentrates

AND

Mill & Smelter By-Products

CONTAINING

NICKEL	COPPER
COBALT	ZINC
TUNGSTEN	LEAD
MOLYBDENUM	BISMUTH
SELENIUM	OTHER METALS

FLUE DUSTS

Fred H. Lenway & Company, Inc.

112 MARKET STREET - - - SAN FRANCISCO 11, CALIFORNIA

CABLES: LENWAY

ECONOMICS OF SOUTH AFRICAN GOLD MINING

by

R. E. WALLACE and A. S. ROBERTSON

With illustrations by JOHN L. TURNER

THIS book (now available for the first time at a "popular" price) has been specially written for the non-technical mining investor by two Johannesburg accountants in collaboration with a geologist and a mining engineer. It explains how to make full use of the wealth of geological, mining and statistical data, published monthly and quarterly, by the South African groups.

Such information, which is almost invariably reported and commented on in the financial and mining press, often presupposes a degree of knowledge not only of geology and of the techniques of prospecting and mining but also of the limits of economic mining and of the mathematics of share valuation, which many investors do not possess. It is this knowledge which *Economics of South African Gold Mining* supplies.

This book tips no shares, nor does it set out to evaluate the prospects for any particular mine. Its sole purpose is to present the essential background knowledge without which a considered view of this or that South African gold mining share is not possible. It does so in terms which the lay investor can understand, yet in sufficient detail to enable him to put the principles involved to practical use.

PRICE 12s. 6d.

COSMO METAL ALLOYS CORPORATION

ESTABLISHED 1895

●

ORES - MINERALS METALS - SCRAP

Special Alloys and Residues containing Nickel Cobalt - Tungsten - Molybdenum - Vanadium Cadmium - Bismuth - Selenium - Precious Metals

FERRO ALLOYS

U.S. EXCLUSIVE REPRESENTATIVE OF FOREIGN MINING COMPANIES

PROCESSORS OF RADIO NICKEL SCRAP AND ALL GRADES OF NICKEL ALLOY SCRAP AND RESIDUES

●

Office: **150 Broadway, New York 38, N.Y.**

Plant: **597-603 Kent Avenue, Brooklyn, 11, N.Y.**

Cable Address: 'EDELORIOUS'

MACHINERY & EQUIPMENT DIRECTORY

Buyers will find the addresses of the companies listed below in the advertisement pages of our recent issues. Alternatively, enquiries may be addressed to *The Mining Journal*, 15 Wilson Street, London, E.C.2. Phone: MONarch 2567.

AGITATORS
Denver Equipment Co. Ltd.

AIR-HOSE COUPLERS
Victor Products (Wallsend) Ltd.

BALL MILLS
Fraser & Chalmers Eng'g Wks.

BALL MILL LINERS
Hadfields Ltd.

BALLS FOR MILLS
Brindley (F. J.) & Sons (Sheffield) Ltd.

BATTERIES
Britannia Batteries Ltd.

BEARINGS
British Timken Ltd.

BELTING — RUBBER & FIRE RESISTANT
British Belting & Asbestos Ltd.
British Tyre & Rubber Co. Ltd.
Dunlop Rubber Co. Ltd.
Turner Bros. Asbestos Co. Ltd.

BOOTS — MINER'S SAFETY
Wilkins & Denton Ltd.

BOREHOLE & DRILLING CONTRACTORS
Conrad Stork Hijsch. N.V.
Craelius Co. Ltd.
Thom (John) Ltd.

BRAKE & CLUTCH LININGS
British Belting & Asbestos Ltd.
Small & Parkes Ltd.
Turner Bros. Asbestos Co. Ltd.

CABLES
British Insulated Callender's Cables Ltd.
Edison Swan Electric Co. Ltd.

CABLEWAYS & ROPEWAYS
Ceretti & Tanfani Ropeway Co. Ltd.

CALCINING PLANT
Fraser & Chalmers Eng'g Wks.

CASTINGS
Hadfields Ltd.

CEMENTATION
Cementation Co. Ltd.

CHEMICALS
I.C.I. (Gen. Chem. Div.)

CLASSIFIERS
Denver Equipment Co. Ltd.
Holman Bros. Ltd.

CLUTCHES — FRICTION
British Belting & Asbestos Ltd.
Small & Parkes Ltd.
Turner Bros. Asbestos Co. Ltd.
Wigglesworth (F.) & Co. Ltd.

COAL BREAKERS
Hadfields Ltd.

COAL CUTTERS
Joy-Sullivan Ltd.

COAL WASHING PLANT
Fraser & Chalmers Eng'g Wks.

COMPRESSORS — AIR
Atlas Diesel Co. Ltd.
Consolidated Pneumatic Tool Co. Ltd.
Holman Bros. Ltd.
Lead Wool Co. Ltd.
Ward (Thos. W.) Ltd.

CONCENTRATING TABLES
Davies Magnet Works Ltd.
Fraser & Chalmers Eng'g Wks.
Holman Bros. Ltd.
Knapp & Bates Ltd.

CONCRETE MIXERS
Ransomes & Rapier Ltd.

CONVEYORS
Broadbent (Robt.) & Son Ltd.
Cable Belt Ltd.
Fraser & Chalmers Eng'g Wks.
Mitchell Engineering Ltd.
Moxey Conveyor & Transporter Co. Ltd.
Wood (Hugh) & Co. Ltd.

CRANES
Ward (Thos. W.) Ltd.

CRAWLER TRACTORS
Mackay Industrial Equipment Ltd.
Marshall Sons & Co. Ltd.

CRUSHERS — JAW
Broadbent (Robt.) & Son Ltd.
Fraser & Chalmers Eng'g Wks.
Hadfields Ltd.
Nordberg M'f'g. Co. Ltd.
Sheepbridge Eng'g Ltd.

CRUSHERS — GYRATORY
Hadfields Ltd.
Nordberg M'f'g Co. Ltd.
Sheepbridge Eng'g Ltd.

CYANIDE PLANTS
Denver Equipment Co. Ltd.
Fraser & Chalmers Eng'g Wks.
Knapp & Bates Ltd.

DIAMONDS — INDUSTRIAL
Smit (J. K.) & Sons Ltd.
Van Moppes (L. M.) & Sons Ltd.
Wolverhampton Diamond Die & Tool Co. Ltd.

DRAGLINE BUCKETS
Hadfields Ltd.
Olding (Jack) & Co. Ltd.

DREDGE BUCKETS
Hadfields Ltd.

DREDGES
Ruston Bucyrus Ltd.

DRILL BITS — DETACHABLE
Holman Bros. Ltd.
Rip Bits Ltd.
Victor Products (Wallsend) Ltd.

DRILL BITS — DIAMOND
Craelius Co. Ltd.
Smit (J. K.) & Sons Ltd.
Van Moppes (L. M.) & Sons Ltd.

DRILL RIGS
Conrad Stork Hijsch. N.V.
Joy-Sullivan Ltd.
Ruston Bucyrus Ltd.
Mitchell Engineering Ltd.
Siemens-Schuckert (G.B.) Ltd.

DRILL RODS
Holman Bros. Ltd.
Rip Bits Ltd.
Victor Products (Wallsend) Ltd.
Wood (Hugh) & Co. Ltd.

DRILL SHARPENERS
Holman Bros. Ltd.

DRILL STEEL
Brindley (F. J.) & Sons (Sheffield) Ltd.
Consolidated Pneumatic Tool Co. Ltd.
Hadfields Ltd.
Victor Products (Wallsend) Ltd.

DRILLS — DIAMOND & CORE
Consolidated Pneumatic Tool Co. Ltd.
Craelius Co. Ltd.
Joy-Sullivan Ltd.
Smit (J. K.) & Sons Ltd.

DRILLS — PROSPECTING
Conrad Stork Hijsch. N.V.
Mitchell Engineering Ltd.
Ruston Bucyrus Ltd.

DRILLS — ROCK
Atlas Diesel Co. Ltd.
Consolidated Pneumatic Tool Co. Ltd.
Holman Bros. Ltd.
Siemens-Schuckert (G.B.) Ltd.
Victor Products (Wallsend) Ltd.
Wood (Hugh) & Co. Ltd.

EARTH MOVING EQUIPMENT
Birtley Co. Ltd.
Blackwood Hodge (J.) & Co. Ltd.
Mackay Industrial Equipment Ltd.
Marshall Sons & Co. Ltd.
Premier Plant & Hire Co. Ltd.
Ward (Thos. W.) Ltd.

ELECTRIC MOTOR & CONTROL GEAR
British Thomson-Houston Co. Ltd.
General Electric Co. Ltd.
Igranic Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Siemens-Schuckert (G.B.) Ltd.

ELECTRICAL SWITCHGEAR
British Thomson-Houston Co. Ltd.
General Electric Co. Ltd.
Igranic Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Siemens-Schuckert (G.B.) Ltd.
Wood (Hugh) & Co. Ltd.

ELECTRICAL PRECIPITATION
Lodge Cottrell Ltd.

EXCAVATORS
Blackwood Hodge (J.) & Co. Ltd.
Premier Plant and Hire Co. Ltd.
Ransomes & Rapier Ltd.
Ruston Bucyrus Ltd.

EXPLOSIVES — BLASTING
I.C.I. (Nobel Division)

FILTERS
Denver Equipment Co. Ltd.

FILTERS — LUBRICATING OILS
Stream-Line Filters Ltd.
Tecalemit Ltd.

FILTERS — SWITCH & TRANSFORMER OIL
Stream-Line Filters Ltd.

FIRE EXTINGUISHERS
Nu-Swift Ltd.
Pyrene Co. Ltd.

FIRST AID EQUIPMENT
Cuxon Gerrard & Co. Ltd.

FLEXIBLE JOINTS
The Unicone Co. Ltd.

FLOTATION EQUIPMENT
Denver Equipment Co. Ltd.
Fraser & Chalmers Eng'g Wks.
Huntington, Heberlein & Co. Ltd.
Knapp & Bates Ltd.

FLOTATION REAGENTS
I.C.I. (Gen. Chem. Div.)
National Chemical Products Ltd.

FOUNDATIONS
Cementation Co. Ltd.

FURNACES
Birlec Ltd.
Huntington-Heberlein & Co. Ltd.

GEOPHYSICAL INSTRUMENTS
Hilger & Watts Ltd.

GEOPHYSICAL & GEOLOGICAL SURVEYS
Craelius Co. Ltd.
Thom (John) Ltd.

GRINDING PANS
Fraser & Chalmers Eng'g Wks.
Holman Bros. Ltd.

HANDLING PLANT
Mitchell Engineering Ltd.
Moxey Conveyor & Transporter Co. Ltd.

HAULAGE GEAR
Austin Hopkinson & Co. Ltd.
Holman Bros. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Robey & Co. Ltd.

HELMETS
Helmets Ltd.
Safety Products Ltd.
Siebe Gorman & Co. Ltd.

HOISTS
Austin Hopkinson & Co. Ltd.
Fraser & Chalmers Eng'g Wks.
Holman Bros. Ltd.

HOSE — RUBBER
British Tyre & Rubber Co. Ltd.
Dunlop Rubber Co. Ltd.

LIGHTING EQUIPMENT
Edison Swan Electric Co. Ltd.
General Electric Co. Ltd.
Igranic Electric Co. Ltd.
Metropolitan-Vickers Electrical Co.
Victor Products (Wallsend) Ltd.

LOCOMOTIVES — DIESEL
Hunslet Engine Co. Ltd.
Ruston & Hornsby Ltd.
Wood (Hugh) & Co. Ltd.

LOCOMOTIVES — ELECTRIC
British Thomson-Houston Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.

LOCOMOTIVES — STEAM
Hunslet Engine Co. Ltd.

LUBRICATION — MECHANICAL
Tecalemit Ltd.

MAGNETIC SEPARATORS
Davies Magnetic Works Ltd.
Huntington, Heberlein & Co. Ltd.
Rapid Magnetic Machines Ltd.

MAGNETS-ELECTRO LIFTING
Igranic Electric Co. Ltd.
Rapid Magnetic Machines Ltd.

MINE CARS
The Distington Eng'g Co. Ltd.

MINE CAR — WHEELS & AXLES
Hadfields Ltd.

MINERS' LAMPS
Premier Lamp & Eng'g Co. Ltd.

PICKS — PNEUMATIC
Atlas Diesel Co. Ltd.
Consolidated Pneumatic Tool Co. Ltd.
Holman Bros. Ltd.
Wood (Hugh) & Co. Ltd.

PLANT — HIRE
Premier Plant & Hire Co. Ltd.
Ward (Thos. W.) Ltd.

POLYVINYL CHLORIDE RESIN
British Geon Ltd.

PUMPING EQUIPMENT
Comet Pump & Eng'g Co. Ltd.
Fraser & Chalmers Eng'g Wks.
Ward (Thos. W.) Ltd.

PUMPS — CENTRIFUGAL
Comet Pump & Eng'g Co. Ltd.
Fraser & Chalmers Eng'g Wks.
Ward (Thos. W.) Ltd.

PUMPS — SAND
Denver Equipment Co. Ltd.
Fraser & Chalmers Eng'g Wks.

PUMPS — SINKING
Thom (John) Ltd.

RAILWAY PLANT & EQUIPMENT
Jones (Wm.) Ltd.
Ward (Thos. W.) Ltd.

RESPIRATORS
Siebe Gorman & Co. Ltd.

ROOF SUPPORTS
Dowty Mining Equipment Ltd.

RUBBER PRODUCTS
British Tyre & Rubber Co. Ltd.
Dunlop Rubber Co. Ltd.
Turner Bros. Asbestos Co. Ltd.

SAFETY EQUIPMENT
Safety Products Ltd.
Siebe Gorman & Co. Ltd.

SCRAPER HAULAGE
Austin Hopkinson & Co. Ltd.
Holman Bros. Ltd.
Wood (Hugh) & Co. Ltd.

SCRAPER LOADERS
Atlas Diesel Co. Ltd.
Eimco (Great Britain) Ltd.
Joy-Sullivan Ltd.

SCREENING PLANT
Broadbent (Robt.) & Son Ltd.
Davies Magnet Wks. Ltd.
Fraser & Chalmers Eng'g Wks.
Moxey Conveyor & Transporter Co.
Nordberg M'f'g Co. Ltd.

SHAFT SINKING
Cementation Co. Ltd.

SHOVEL LOADERS
Atlas Diesel Co. Ltd.
Eimco (Great Britain) Ltd.
Joy-Sullivan Ltd.

SURVEYING INSTRUMENTS
Hilger & Watts Ltd.

TEST SIEVE VIBRATOR
The Pascall Eng'g Co. Ltd.

THICKENERS
Denver Equipment Co. Ltd.

TIMBER PRESERVATIVES
Hickson's Timber Impregnation Co. (G.B.) Ltd.

TRANSFORMERS
British Thomson-Houston Co. Ltd.
General Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.

TUBE MILL LINERS
Hadfields Ltd.

VEE-ROPE DRIVES
Wigglesworth (F.) & Co. Ltd.

WATER SUPPLY EQUIPMENT
Thom (John) Ltd.

WELDING
Cementation Co. Ltd.

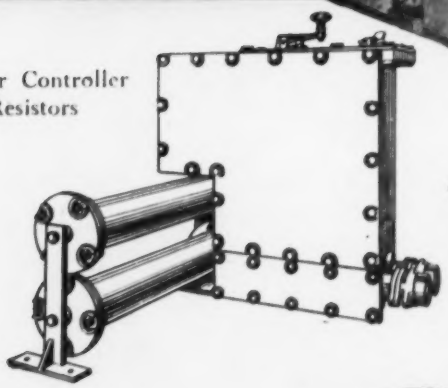
WELDING ELECTRODES
Metropolitan-Vickers Electrical Co. Ltd.

WELDING EQUIPMENT
British Insulated Callender's Cables Ltd.
Lincoln Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Siemens-Schuckert (G.B.) Ltd.

WIRE ROPE & ACCESSORIES
British Ropes Ltd.

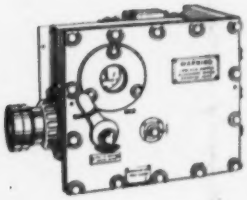
WINDING EQUIPMENT — ELECTRIC
British Thomson-Houston Co. Ltd.
General Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Robey & Co. Ltd.

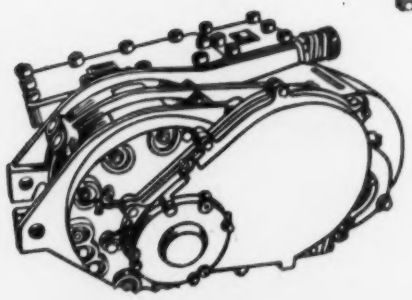
Master Controller and Resistors



FLP

Battery Switch Box





Motor with gears

The British made "ATLAS" 7 ton Battery Mining Locomotive manufactured by Wm. Neill & Son (St. Helens) Ltd. fitted with flame-proof electrical equipment built by

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Kx/L301

Member of the A.E.I. group of companies

Published by The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2, and printed by Washburn & Sons Ltd., 25-27 Queens Road, Southend-on-Sea, Essex. Registered as a Newspaper.